Birds in Wales

Vol. 10 No. 1 August 2013 ISSN 1359-1649

Edited by Stephanie J. Tyler

CONTENTS

Editorial and acknowledgements 2

Life on the edge - the changing fortunes of Dartford Warblers in Glamorgan 3

Population size, ecology and movements of gulls breeding on Flat Holm Island 7

A preliminary study of Common Crossbill *Loxia curvirostra* vocal types in Wales 22

Notable Welsh Ornithologists of the Twentieth Century 29

Observations of a communal Ring Ouzel *Turdus torquata* roost site in North Wales during autumn 2009 40

Ramsey Island Manx Shearwater geolocation study: Field Report 2012 42

Tracking the migration of Atlantic Puffins on Skomer Island 48

Cors Goch Yellowhammer Project 58

An obituary to Jack Donovan MBE 1928-2012 60

Front cover photograph of Lesser Black-backed Gull by Sam Whitfield
Rear cover photograph of Dartford Warbler by Paul Roberts
Welsh translations by Rhion Pritchard

Published in August 2013 by The Welsh Ornithological Society
www.birdsinwales.org.uk
Charity No. 1037823
Price: £7.00

EDITORIAL

I am delighted to include in this issue a range of very varied papers.

South Wales is well represented with an account of the changing fortunes of Dartford Warblers in Glamorgan by Paul Roberts and of the Lesser Black-backed Gull population on Flat Holm by Viola Ross-Smith and colleagues. The future of Flat Holm is uncertain although for the time being Cardiff City Council is to continue managing it.

An interesting account of the differences in Crossbill vocalisations in different geographical areas is provided by Andrew Dixon. Fieldworkers in Wales could play an important role in promoting our understanding of Crossbill calls if they could collect good quality recordings from their areas and send these to Andrew.

Julian Driver reports on a roost of Ring Ouzels in Snowdonia. Roosts of this species are very rarely recorded.

A fascinating account of notable Welsh Ornithologists is based on the talk that Graham Williams gave at the WOS Conference in 2011.

Papers resulting from WOS 2012 Conservation Awards include one on the Manx shearwater geolocation study on Ramsey by a team from Oxford and from the RSPB, on migration of Puffins on Skomer by another team from Oxford, the EGI and Imperial College, London and a report on the Yellowhammer feeding project on Anglesey by the North Wales Wildlife Trust.

Steph Tyler

Dartford Warbler. *Sketch: Colin Richards*

Life on the edge - the changing fortunes of Dartford Warblers in Glamorgan

Paul Roberts

42 Mount Earl, Bridgend, CF31 3EY, Glamorgan

NPaulRoberts@aol.com

Summary

The colonisation by Dartford Warblers and their subsequent fortunes in Glamorgan between 2000 and 2012 are described.

Crynodeb

Disgrifir y modd yr ymsefydlodd Telor Dartford ynghyd â'i hynt a'i helynt ym Morgannwg rhwng 2000 a 2012.

Introduction

The rapidity with which the distribution of certain bird species can change is a constant source of fascination and wonder. We are all familiar with the meteoric rise of the Little Egret Egretta garzetta in Britain, once a rare vagrant and now a relatively numerous breeding resident, all in the space of a couple of decades. A similar situation might also be about to occur in relation to Great White Egret *Ardea alba*, Cattle Egret *Bubulcus ibis* and Glossy Ibis *Plegadis falcinella* to name a few; only time will tell.

Another bird that has exhibited a recent rapid change in status in the UK happens to be one of the Glamorgan's rarest breeders – the Dartford Warbler *Sylvia undata*. This is essentially a species of the warmer parts of western Europe and north-west Africa, with a range lying west of a line from southern Britain to the heel of Italy, with Spain being its stronghold.

Across its range it favours dense, homogeneous scrub, garrigue and low maquis ca.0.5-1.5m in height and dominated by species such as *Ulex, Erica, Rosmarinus, Genista*, *Cistus* and *Quercus coccifera* (del Hoyo et al. 2006). Breeding habitat in Britain tends to be mainly lowland heath dominated by *Ulex* spp. (gorse) and *Erica* spp. and *Calluna vulgaris* (heaths/heathers). Gorse is especially favoured, being richer in invertebrates than heather and providing greater shelter from drifting snow. Although partially migratory and dispersive, many birds remain on the breeding areas all year. It is primarily a lowland species in the north of its range but occurs to 1,800-2,000m in the Pyrenees and north-west Africa (del Hoyo et al. 2006).

Its current IUCN Red List category is Near Threatened, due to recent moderately rapid declines, most notably in the core population in Spain, where around 75% of the global population is thought to reside. The reasons for the declines are not entirely clear, but include habitat degradation and modification. It is presently on the UK Amber List of Birds of Conservation Concern, partly as a result of these declines, but also because of the localised - and therefore susceptible - native breeding population.

As a small insectivorous species it is vulnerable to cold winters, showing marked fluctuations in numbers. The 19th century British population extended north to Oxfordshire and Shropshire, and from Kent to Cornwall, but subsequently contracted to the southernmost counties of England in the first half of the 20th century (Snow & Perrins. 1998). Following the severe winter of 1962-3 the population collapsed from 450 pairs to just 11. Numbers gradually recovered from this low point to estimates of 950 pairs in 1988-90, 1,600-1,670 in 1994 (Snow and Perrins. 1998) and 3,214 in 2006 (Wotton, Conway, Eaton, Henderson & Grice. 2009).

Despite its rapid colonisation of southern England it wasn't until 1998 that nesting was first proven in Wales - at an upland site in the western valleys near Blaenavon in Gwent where two broods were reared (Venables et al. 2008). Up to two pairs continued to breed there for several years. This was perhaps not unexpected, given that the Devon population was then thriving and had expanded along the north coast from the East Devon Commons and southern coastal belt into Dartmoor, Exmoor and along the north coast as far Somerset, where breeding was first recorded in 1993. We cannot be sure of the origin of our Welsh population, but it is only a short hop across the Bristol Channel from north Devon to Glamorgan and it is surely not an unreasonable supposition that our birds arrived mainly from this source.

Status of Dartford Warblers in Glamorgan

Breeding was first confirmed in Glamorgan in 2000, with one pair at Port Eynon Point, Gower and two pairs at an area of unenclosed common land in Vale of Glamorgan. However, anecdotal reports suggest that nesting may have occurred at the latter site in 1999. The Vale site – which remains the sole breeding location in that administrative area – along with the south Gower coast, subsequently became the strongholds for the species in Glamorgan.

Birds of Glamorgan (Hurford and Landsdown 1995) lists Dartford Warbler as an extremely rare visitor, with just three individuals. These were recorded in December 1969, October 1975 and April 1980, all in the west of the county. These were the first, third and fourth respectively to be recorded in Wales. Records after this, but prior to the first confirmed breeding, comprised singles - at Kenfig National Nature Reserve in April 1996, February 1999 and November 1999 and at Nash Point in September 1998 and November 1999. It is perhaps not surprising that a small upsurge of sightings occurred in the years leading up to the colonisation.

Monitoring at the Vale of Glamorgan site has shown that Dartford Warblers increased slowly there from the initial colonisation in 2000 (or possibly 1999) to a high point in 2008, when nine pairs were identified. Unfortunately, the population crashed following the unusually cold winter of 2008-9, with only one pair remaining in 2009. The following two winters were also colder than the recent average and no more than a single pair has been recorded in any of the subsequent breeding seasons, despite the ample presence of suitable habitat. This decline after recent cold winters was also reported at sites in

England. Clearly the species only has a tenuous hold at this site at present, not helped in 2012 by very poor weather from April to mid July, when no breeding success was noted from the single pair.

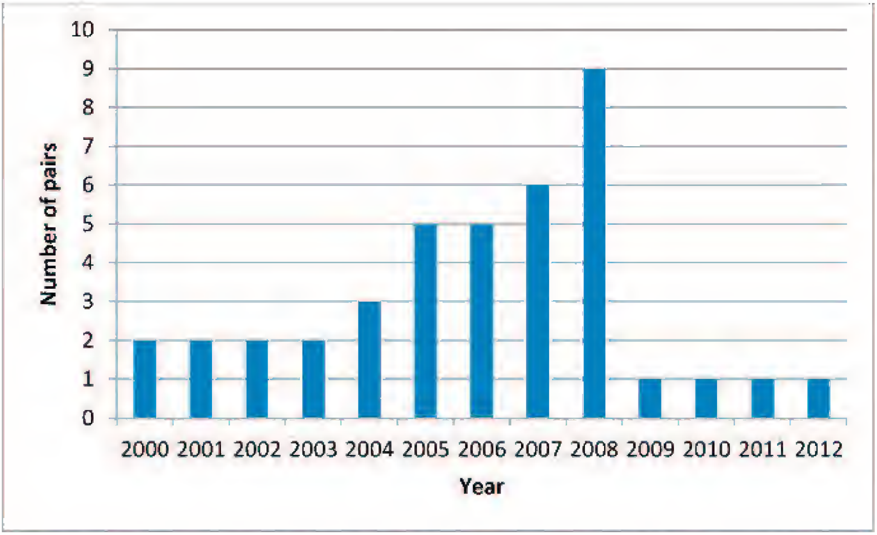


Figure 1. Number of pairs of Dartford Warblers breeding in Vale of Glamorgan

A similar picture also occurred in Gower – a slow colonisation in the early part of the decade, followed by an increase in numbers and range in 2004-8 and thereafter a decline as a result of the run of cold winters. At its peak in Gower the population was present along much of the south coast, but has always remained rare elsewhere on the peninsula. No census was taken, but it is likely that the number of pairs was in double figures at its peak and there are indications that losses due to cold were not quite as severe here as in the Vale location.

During this peak period 2004-8 Dartford Warblers started to colonise other parts of Glamorgan, away from their Vale and Gower strongholds. Breeding activity was confirmed at Llanilid former opencast in Rhondda Cynon Taf (two pairs) and along the hills above Port Talbot and Margam in Neath Port Talbot (several pairs). Singing males in suitable habitat were noted in the Llynfi Valley, near Mynydd y Gaer and at Porthcawl, all situated in Bridgend County Borough. However, breeding was not proven at the latter sites. Probably fewer than ten pairs occurred away from the Vale and Gower.

This period also saw a small increase in records outside the breeding season away from the nesting areas. The majority of these relate to immature birds in autumn at coastal locations, most notably at Kenfig National Nature Reserve and along the western Heritage

Coast in Vale of Glamorgan. Further reports during this period were of singles at Cardiff Bay Barrage in November 2005 and at Merthyr Tydfil in October 2006. The latter is the furthest inland the species has been recorded in Glamorgan.

In the Principality some 72 pairs were estimated to have bred in 2006 with confirmed breeding in Gwent, Glamorgan, Carmarthenshire and Pembrokeshire (Wotton & Conway 2008). Numbers crashed following recent severe winters but breeding was confirmed as far north as the Lleyn Peninsula in 2011.

The future locally for the Dartford Warbler remains uncertain with a small breeding population maintaining a tenuous hold at the core areas of south Gower and in the Vale, and possibly also in Neath Port Talbot. It is feasible that the restricted and fragmented nature of the suitable habitat in Glamorgan will militate against the long term survival of these relatively isolated populations. Efforts are being made to work with landowners at the Vale site to encourage the rotational management of gorse so that areas of suitable breeding habitat - dense stands of gorse, neither too short nor too rank - are continuously available. Maybe future climatic amelioration will see the colonisation of the uplands. Whatever the case, it would surely be a cause of regret were this delightful little warbler to disappear from our local avifauna.

Acknowledgements

I thank Jerry Lewis and Graham Williams for helpful comments on an earlier draft of this paper.

References

BirdLife International (BLI). 2008. *2008 IUCN Redlist status changes*.

JNCC. 2009. *Birds of Conservation Concern*, Joint Nature Conservation Committee.

Hurford, C.; Lansdown, P. 1995. *Birds of Glamorgan*.

del Hoyo, J.; Elliott, A.; Christie, D. 2006. *Handbook of the Birds of the World, vol. 11: Old World Flycatchers to Old World Warblers*.

Venables, W.A., Baker, A.D., Clarke, R.M., Jones, C., Lewis, J.M.S., Tyler, S.J., Walker, I.R. & Williams, R.A. 2008. *The Birds of Gwent*. Gwent Ornithological Society. Christopher Helm, London.

Wotton S., Conway G., Eaton M., Henderson I. & Grice P. 2009. The status of the Dartford Warbler in the UK and the Channel Islands in 2006. *British Birds* **102**: 230-246.

Wotton, S. & Conway, G. 2008. The Woodlark and Dartford Warbler surveys in Wales in 2006. *Welsh Birds* **5**: 58-63.

Snow, D.W. & Perrins, C.M. 1998. *The Birds of the Western Palearctic, Concise Edition, vol. 2: Passerines*.

Population size, ecology and movements of gulls breeding on Flat Holm Island

Viola H. Ross-Smith[1,2], Greg J. Conway[1], Richard J. Facey[2], Brian H. Bailey[3], Matthew Lipton[4], Samuel A. Whitfield[4] & Peter N. Ferns[5]

[1]British Trust for Ornithology, The Nunnery, Thetford, Norfolk, IP24 2PU
[2]Flat Holm Ringing Group c/o 28 Clos Dewi Sant, Cardiff CF11 9EW,
[3]Tamarisk House, Wards Court, The Green, Frampton-on-Severn, Gloucestershire, GL2 7DY
[4]Flat Holm Project, Cardiff Harbour Authority, Queen Alexandra House, Cargo Road, Cardiff , CF10 4LY
[5]Cardiff School of Bioscience, Biomedical Sciences Building, Museum Avenue, Cardiff, CF10 3AX

Summary

Flat Holm Island supports an important breeding colony of Lesser Black-backed Gulls, representing approximately 3% of the British breeding population of this species. Unlike many other colonies of this Amber Listed gull elsewhere in Wales and Great Britain, the Flat Holm population is apparently not in decline. We document the establishment and growth of the colony and examine the ecology and demography of this population, and make some comparisions with the island's Herring Gull population.

Crynodeb

Ceir nythfa bwysig o'r Wylan Gefnddu Leiaf ar Ynys Echni, tua 3% o'r boblogaeth sy'n nythu ym Mhrydain. Yn wahanol i nythfeydd eraill yr wylan yma, sydd ar y Rhestr Oren, mewn mannau eraill yng Nghymru a Phrydain, nid yw'n ymddangos fod y niferoedd yn lleihau ar Ynys Echni. Rydym yn disgrifio sefydliad a thwf y nythfa, ac yn edrych ar ecoleg a demograffeg y boblogaeth yma, gan ei chymharu â'r boblogaeth o Wylan y Penwaig ar yr ynys.

Introduction

Located approximately 8 km south of Cardiff in the mouth of the Severn Estuary, Flat Holm (51°23'N, 3°07'W) is Wales' southernmost point (Fig. 1), and is administratively part of Cardiff. At 32 hectares (ha) at high tide, and up to 52ha at low tide, Flat Holm is a small island and, as its name suggests, has a low elevation above mean sea level. The island slopes out of the sea on the western side and rises to a high point of 32m above sea level near the lighthouse on the south-eastern point of the island. The island is composed of Carboniferous limestone, with cliffs around the south and east of the island, giving way to rocky shores and shingle beaches towards the north and west.

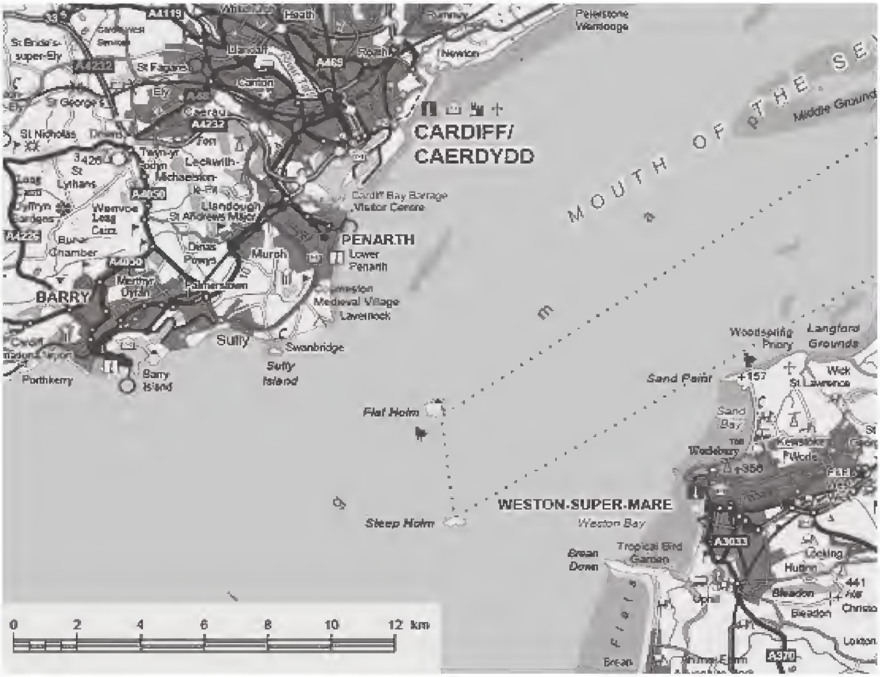


Figure 1. A 1:200,000 map of the inner Bristol Channel, showing Flat Holm Island. © Ordnance Survey/EDINA Digimap, 2005.

Archaeological excavations have revealed that Flat Holm has been occupied by man for thousands of years, with the oldest known remains dating from the Bronze Age. Today, the only human inhabitants of the island are a handful of wardens and volunteers employed by the Flat Holm Project, which has managed the island as a Local Nature Reserve on behalf of Cardiff City Council since 1986. During the spring and summer months, the most prominent, numerous and locally infamous inhabitants of Flat Holm are the island's gulls.

The history of Flat Holm's gulls

The first record of gulls breeding on Flat Holm dates from 1954, when five Herring Gull *Larus argentatus* nests were found. These birds were presumed to have colonized Flat Holm from the neighbouring isle of Steep Holm, situated approximately 3.7 km away in North Somerset, which is thought to have hosted breeding gulls since the eighteenth century (Mudge 1978). Lesser Black-backed Gulls *L. fuscus* were first reported breeding on Flat Holm in 1957. Initially the birds bred across the island but in the mid-1980s, Flat Holm's management changed, with nests on the northern part of the island cleared to make way for maritime grassland. This has limited the area available for nesting and undoubtedly affected the island's gull population. Lesser Black-backed Gulls currently largely inhabit the top of the island, which is primarily covered by vegetation including Common Nettle *Urtica dioica*, Elder *Sambucus nigra*, Bracken *Pteridium aquilinum*, Bramble *Rubus fruticosus* and Wild Turnip *Brassica rapa*, interspersed by paths and some rocky areas. Herring Gulls are mostly confined to the cliffs, where vegetation is sparse and mostly comprises maritime species, such as Sea Storks Bill *Erodium maritimum* and Thrift *Armeria maritima*. Great Black-backed Gulls *L. marinus* have also nested on Flat Holm since 1962 (Mudge 1978), but numbers have remained stable at one to two breeding pairs, which occupy prominent cliff nest sites.

Flat Holm is designated as a Site of Special Scientific Interest (SSSI), which includes the colony of Lesser Black-backed Gulls among its features. These gulls represent approximately 3% of the British breeding population of this species (Mitchell et al. 2004). As their nests are readily accessible and the vegetation and topography makes for easy observation, the island's gulls have the subject of research since the 1970s. This has led to the production of various PhD theses and peer-reviewed publications (e.g. Mudge 1978, Bolton 1991, Stanworth 1998, Ross-Smith 2009). Flat Holm's Lesser Black-backed Gulls are also the subject of a long-term colour-ringing project, some results from which are described below.

Methods

Population monitoring

Regular censuses of Flat Holm's breeding gulls took place between 1954 and 1980, which were superseded by a rigorous annual count in 1983 (Fig. 3). These counts occur in mid-May and involve a census of apparently occupied nests (i.e. nests with eggs and/or chicks). The technique used is described fully in Ferns and Mudge (1981). Briefly, a tally is made of each nest, which is marked with a small amount of paint. The error rate (i.e. the percentage of unmarked nests) is calculated by a different person later the same day, who walks a transect through the colony noting marked and unmarked nests. Because of nest clearance on the island's northern part (Fig. 2), only the southern area has been censused since the mid-1980s, along with the cliffs, where nests are counted from a boat. In 2006 the count on the top of the island was only partially carried out due to poor weather. The Lesser Black-backed Gull population that year was therefore estimated, and no numbers are given for Herring Gulls because the cliff count was not possible at all.

Nesting behaviour

A detailed study of the nesting behaviour of Flat Holm's Lesser Black-backed Gulls was carried out between early-April and late-June 2007 and 2008. This encompassed almost the entire Lesser Black-backed Gull laying period in each year. A small number of late eggs were recorded at the end of each season, but these were mostly a result of re-laying following earlier breeding failure. The majority of hatching was also witnessed.

The area chosen for monitoring was towards the centre of the south-western part of the gull colony (Fig. 2), and included a range of nesting habitats from those in open, rocky locations, to nests in densely vegetated areas where they were almost completely concealed. The 7700m^2 study area, (110m x 70m) was divided into a 10m by 10m grid, which was walked systematically on a daily basis to check for nesting activity. All eggs were measured and marked with the letters A, B or C (for first, second and third-laid respectively) in indelible non-toxic ink. Clutch size was counted as the number of eggs produced per breeding attempt. If a clutch was re-laid following previous breeding failure, this was considered a separate breeding attempt. Every nest with eggs was recorded by a Cartesian coordinate system within the grid, so each one could be easily relocated and nearest neighbour distance calculated.

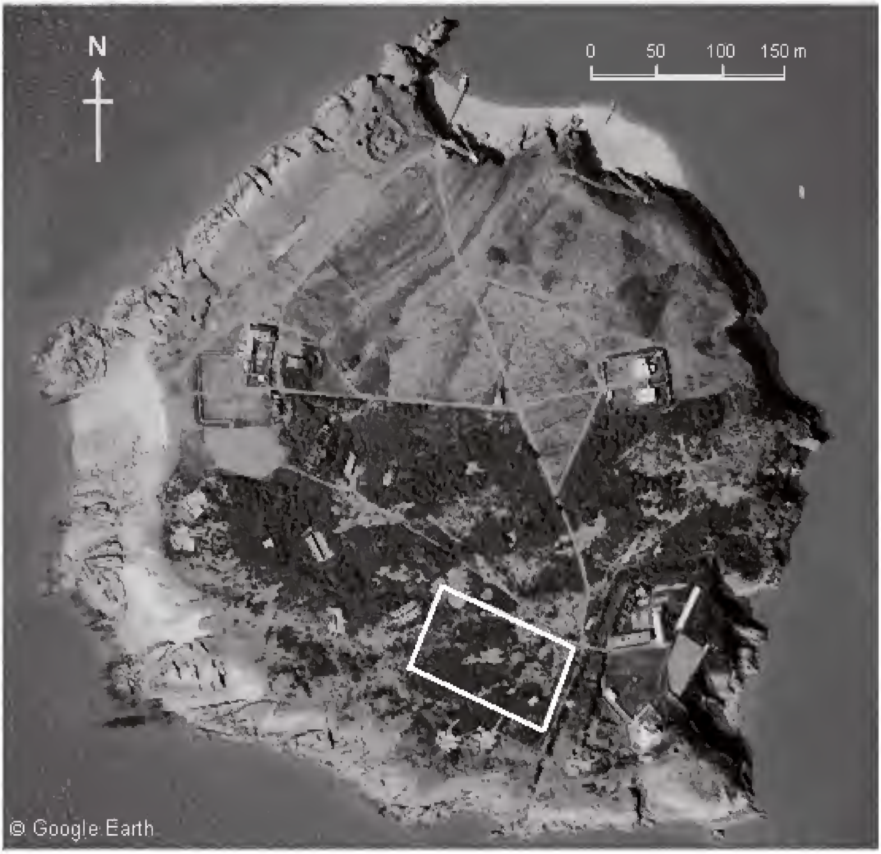


Figure 2. An aerial view of Flat Holm. The division of the island can be seen between the managed north side, where only grassland persists, and the unmanaged south side, where thicker vegetation grows. The region of the gull colony monitored in this study fell within the white rectangle.

Ringing

Bird ringing is a cheap and effective way of providing invaluable information on species' survival, recruitment and movements (including migration and dispersal), as well as allowing histories of individual birds to be studied. Although a small number of individuals were marked previously, Flat Holm's gulls only have been systematically ringed since 1995, when a colour-ringing scheme was adopted for the Lesser Black-backed Gulls. All birds are fitted with a metal BTO ring on their right leg and an individually inscribed Darvic ring on their left. The colour combination used changes every year, although codes always comprise a number and two letters. One hundred individuals have been ringed annually (with the exception of 2008 when ringing was cancelled due to poor weather), all of which were pulli (nestlings) caught shortly before fledging (typically in early July). In some years a number of breeding adults have also been ringed.

As well as resightings on the island, colour-ringed Lesser Black-backed Gulls from Flat Holm are spotted in many other locations throughout the year. Reports of these resightings were used to generate a map of the birds' movements (Fig. 7).

Statistical treatment

Results were analyzed in R version 2.8.1 (R Development Core Team 2008), "lme4" (Bates et al. 2008). Statistical tests were two-tailed, with a significance level of 0.05. All values are given as arithmetic mean ± S.E.

Generalized linear mixed models with a binomial error were fitted using the "lme4" package, to investigate variables influencing hatching success (binary response variable for hatching or not), with the identity of the nest from which the eggs originated fitted as a random factor. Eggs of unknown fate were omitted from the analysis, so models included 873 eggs recorded in 2007, and 948 in 2008.

The distribution of nests in the colony in each year was tested to see if it differed from complete spatial randomness (CSR). This was done by comparing the distribution of nests within each 100m^2 square of the grid with that predicted by a Poisson distribution using the χ^2 test (Crawley 2007).

Annual estimates of adult survival were produced according to the methods used by the Retrapping Adults for Survival (RAS) Scheme (http://www.bto.org/volunteer-surveys/ringing/surveys/ras). Estimates were derived using a form of the standard Cormack-Jolly-Seber capture-mark-recapture model (Lebreton et al. 1992), with "marks" equating to gulls' colour-rings, and "recaptures" to resightings of breeding adult birds on Flat Holm that had been ringed there as chicks in previous years. This model assumes survival probabilities vary annually. Annual recapture probabilities were modelled as a function of the amount of effort recorded (in this case, the number of hours spent each year on Flat Holm looking for colour-ringed adults in the colony). The annual estimates of survival reported are therefore the probability that adult birds have been found to return to the island the following year, and will be lower than the true survival rate. Adult survival estimates could only be calculated for all years from 2003 to 2011, as there was an insufficient number of resightings in other years.

Results

Population monitoring

Numbers of Lesser Black-backed Gulls rose steeply on Flat Holm between the 1950s and the 1970s, reaching more than 4,000 breeding pairs by 1974. The population then fell in the late-1970s. When systematic gull counts began on Flat Holm in 1983, there were 2,027 pairs of Lesser Black-backed Gulls on the island. Following the onset of management, numbers fell to a low of 1,133 pairs, in 1987. Between then and the early-2000s, numbers rose steadily and have levelled off at around 4,000 pairs, in a figure similar to that reported in the mid-1970s.

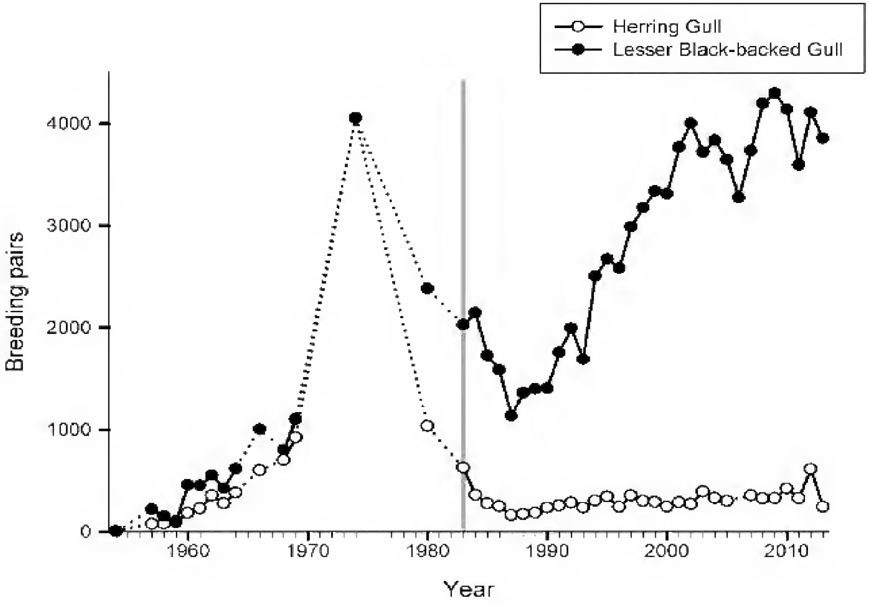


Figure 3. The number of Lesser Black-backed Gull and Herring Gull pairs counted on Flat Holm Island from 1957 until 2013. Dotted lines – years skipped between counts. Vertical grey line – start of current censusing method (Ferns & Mudge 1981).

Herring Gull numbers initially matched the trend seen in Lesser Black-backed Gulls, also rising steeply to more than 4,000 pairs in 1974. The population then also declined, but much more steeply than the fall seen in the Lesser Black-backed Gull population. Although Herring Gull numbers have recovered slightly from a low point of 160 pairs in 1987, they have remained reasonably constant since the early-1990s, oscillating between approximately 250 and 400 pairs in most years. The number of Herring Gulls has therefore declined catastrophically since the 1970s and has also been low relative to the number of Lesser Black-backed Gulls since this time.

Nesting behaviour

In total, 950 eggs in 348 nests were tracked in 2007 (including two Herring Gull pairs and one mixed Herring/Lesser Black-backed Gull pair), and 1011 eggs in 366 nests in 2008 (including one Herring Gull pair and one mixed Herring/Lesser Black-backed Gull pair). The first egg laid in the study grid was detected on April 13th 2007 (the first egg found on the island was April 9th 2007), and April 10th 2008 (the island's first egg was found on April 4th 2008). As very few eggs were found elsewhere on the island at the start of each breeding season, the timing of nesting activity in the study area was typical of that in the colony as a whole. The first chicks were found on May 15th and 13th in 2007 and 2008 respectively. Egg production in the monitored area peaked in the fourth week after laying commenced (Fig. 4), and chick hatching in the eighth week. These peaks were more pronounced in 2008 than in 2007.

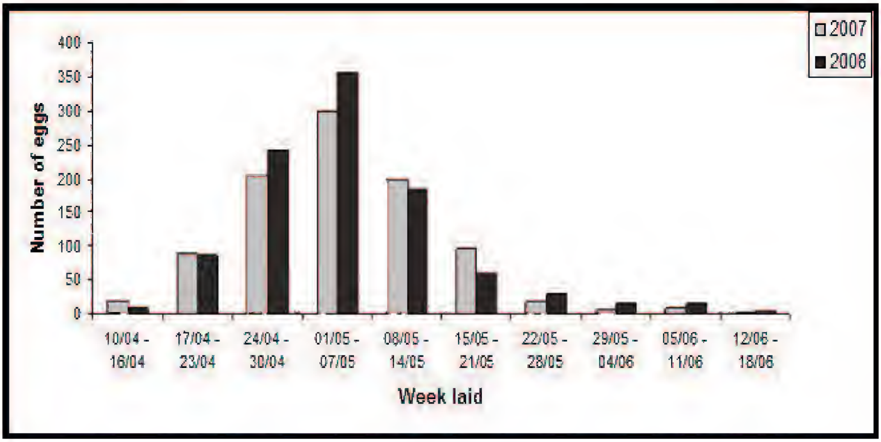


Figure 4. Seasonal variation in Lesser Black-backed Gull egg production on Flat Holm in 2007 and 2008.

Eggs were normally laid every other day, although a gap of two days was sometimes seen between the production of A and B eggs in a clutch of three. Incubation time was 28.34 ± 0.06 days for A eggs (2007, n = 162; 2008, n = 204), 26.58 ± 0.05 days for B eggs (2007, n = 155; 2008, n = 225), and 25.69 ± 0.05 days for C eggs (2007, n = 111; 2008, n = 179). Overall incubation time was 26.95 ± 0.05 days.

The mean clutch size in the monitored area was 2.84 ± 0.01 in 2007 and 2.82 ± 0.01 in 2008 (Table 1), values that did not differ significantly between years (Wilcoxon's rank sum test, W = 484406, p = 0.4667). The proportion of nests with each clutch size also did not differ between years ($\chi 21 \leq 0.04$, $p \geq 0.8332$ in all cases). The modal clutch size was three eggs in both years (Table 1).

Table 1. Lesser Black-backed Gull clutch sizes for first clutches.

Year	Clutch size	No. nests
2007	1	25 (7.2%)
	2	56 (16.1%)
	3	266 (76.4%)
	4	1 (0.3%)
	Total	348
2008	1	24 (6.6%)
	2	61 (16.7%)
	3	280 (76.5%)
	4	1 (0.3%)
	Total	366

In 2007, 64.7% of eggs in the monitored area were known to have hatched, compared to 65.7% of eggs in 2008. In 2007, 27.5% of eggs were known to have failed to hatch, while in 2008 this figure was 28.1%. The remaining eggs in each year (7.8% in 2007, 6.2% in 2008) were of unknown fate, either because the field season finished before they were due to hatch, or because they disappeared at approximately their due hatching date, but no evidence of hatching was found. These figures give a minimum estimate of 1.76 chicks hatched per nest in 2007, and 1.81 in 2008. Of the eggs in which hatching success could be ascertained, the likelihood of hatching was significantly positively associated and clutch size (GLMM, $z \geq 3.58$, $p \leq 0.0003$). This effect can be clearly appreciated from the raw figures (combining numbers for 2007 and 2008), which showed that 18.6% of eggs from single egg clutches hatched, against 56.0% of eggs from clutches of two, and 73.4% of eggs from a clutch size of three. Hatching failures were typically a result of infertility (i.e. the eggs never hatched), or egg disappearance. The latter affected 11.9% of all eggs recorded in 2007, and 12.1% in 2008. Disappearance partly resulted from intraspecific predation by neighbouring gulls (Ross-Smith, personal observation).

Gulls apparently showed strong nest site fidelity between one year and the next. In each year, particular parts of the study grid were much more densely populated than other areas (Fig. 5). Some of this spatial structure was due to vegetation (especially thick Nettles and Elder), which made nesting impossible in certain areas. Density ranged from 0 to 13 nests per $100m^2$ grid square in 2007, and 1 to 14 nests per $100m^2$ in 2008. The most densely populated areas were exposed, open areas, with short grass or bare, rocky ground. The overall nest density was $0.0452m^{-2}$ in 2007, and $0.0475m^{-2}$ in 2008 and differed significantly from CSR in both years ($\chi^2_{76} = 118.43$, $p = 0.0013$ in 2007, $\chi^2_{76} = 143.71$, $p < 0.0001$ in 2008). Mean nearest neighbour distance was 2.59 ± 0.07m in both years.

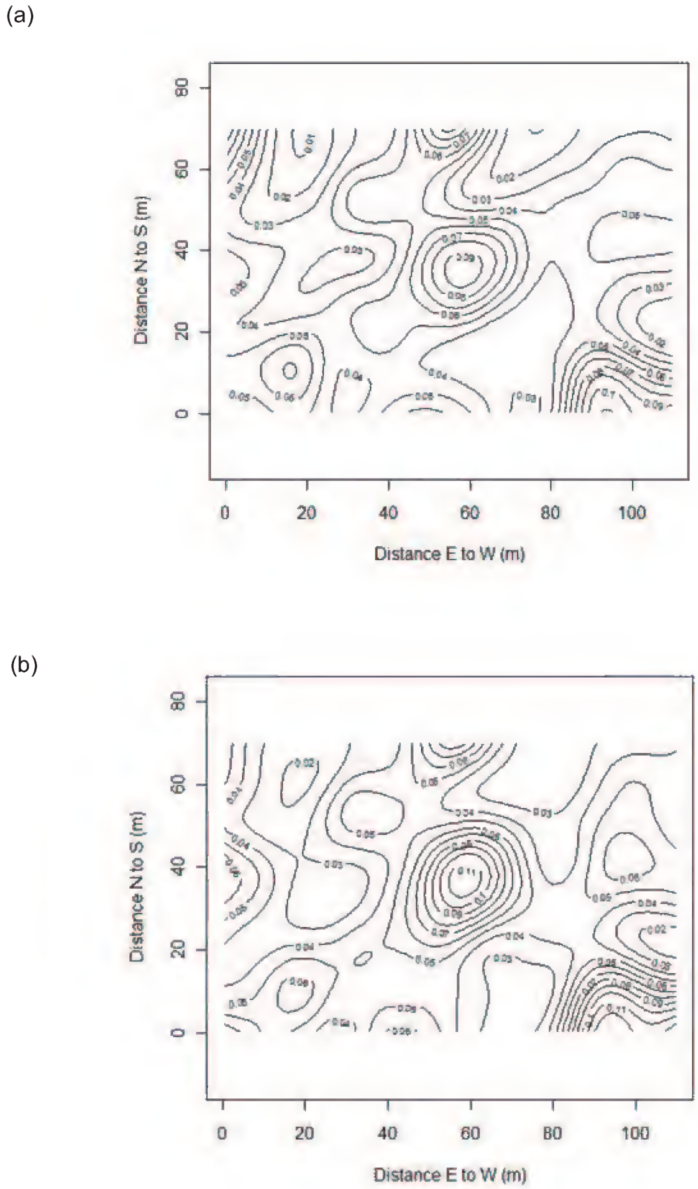


Figure 5. Nest density in the monitored area of the Flat Holm Lesser Black-backed Gull colony in (a) 2007, (b) 2008. Contour lines represent nests m^{-2}.

Ringing data
Adult survival on Flat Holm was between 90% and 95% for most years between 2003 and 2010 (Fig. 6). The exception was 2007, when paucity of data is most likely responsible for the dip seen.

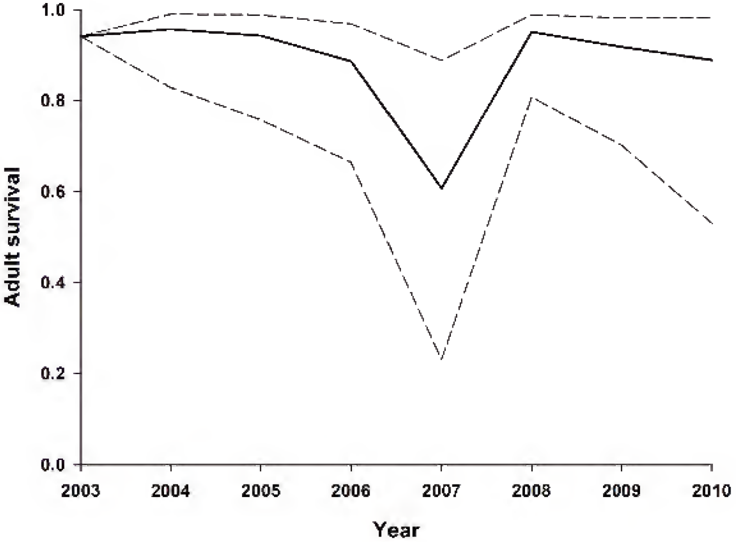


Figure 6. Adult Lesser Black-backed Gull survival on Flat Holm Island from 2003 until 2010. Note annual survival estimates are given for the year from which they relate, i.e. the 2010 estimate relates to the proportion surviving to 2010.

Nearly 7,000 resightings of colour-ringed Flat Holm gulls have been submitted to date (Fig. 7). Records have come from Wales, England, Germany, the Netherlands, Belgium, France, Spain, Portugal, Morocco, Western Sahara and the Gambia.

Discussion

Flat Holm Island supports a healthy population of breeding Lesser Black-backed Gulls. This can be seen in the population trend, which appears to have reached carrying capacity at around 4,000 pairs, having recovered from a much lower level in the early to mid-1980s, when numbers were at their lowest following the onset of island management and outbreaks of botulism (Worrall 1987). The trend in Herring Gulls is much less encouraging, with this population never picking up again following declines (due to botulism and management again) in the late-1970s and early-1980s. The population is now apparently stable at approximately one tenth of that found in the 1970s. Herring Gulls might now to be out-competed by Lesser Black-backed Gulls for breeding sites on Flat Holm because of the greater distance birds have to commute to obtain food for their

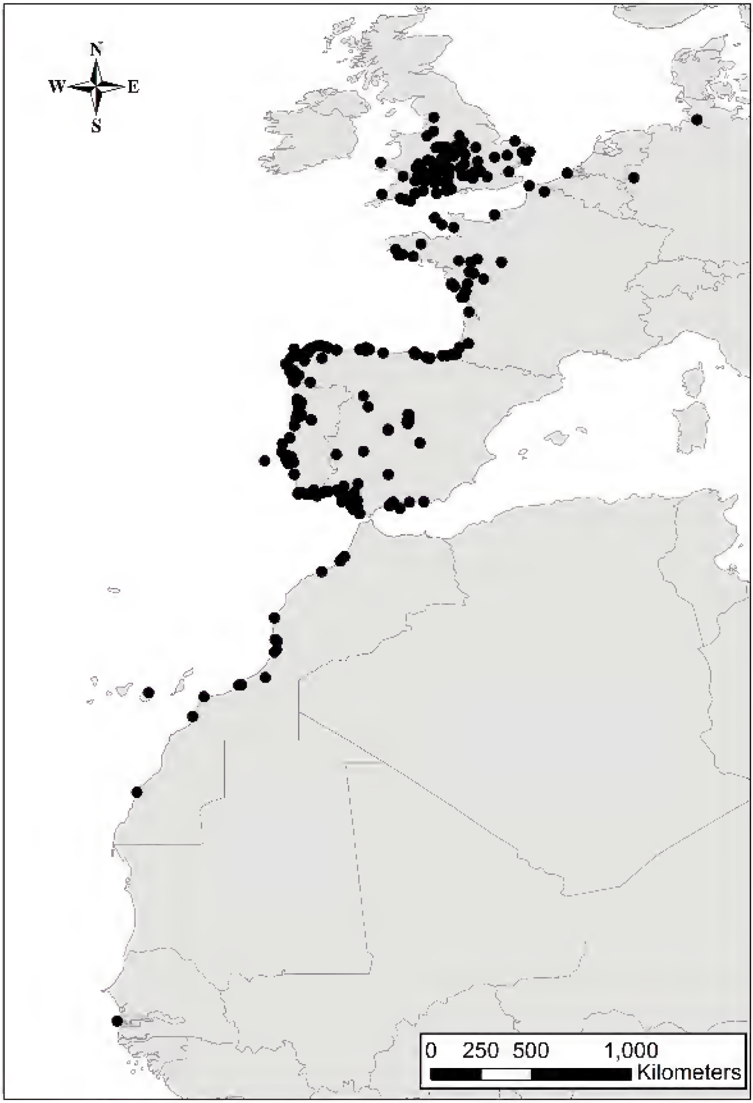


Figure 7. The location of resightings of colour-ringed Lesser Black-backed Gull from Flat Holm Island. Each black dot represents a resighting. Note that several birds are seen in the same location, and certain individuals are reported multiple times.

chicks, which Lesser Black-backed Gulls are better able to cover (Verbeek 1977; Thaxter et al. 2012).

Analysis of nesting behaviour showed that the clutch size of Flat Holm's Lesser Black-backed Gulls was towards the top end of the range reported for this and closely related species (Harris 1964; Haycock & Thelfall 1975; Davis & Dunn 1976), and that the proportion of eggs hatching from small clutches was higher than that found elsewhere (Harris 1964; Haycock & Thelfall 1975). If these measures of breeding success translate into fledging success and recruitment (which were not measured in this study), they provide some indication of why Flat Holm's Lesser Black-backed Gull population has increased so much in the mid-1980s.

The non-random spatial distribution found in the nest placement of the Lesser Black-backed Gulls monitored is typical for seabird colonies (e.g. Oro 2008). However, the density of nests in this study was high compared to that reported for other closely related large white-headed gulls, both in terms of the mean and peak densities found (Haycock & Thelfall 1975; Murphy et al. 1992; Jehl 1994).

The breeding parameters measured on Flat Holm indicated a healthy Lesser Black-backed Gull colony, with good hatching success. These factors were also highly consistent between years, suggesting stable environmental conditions. Furthermore, the level of egg loss found was lower than that seen at colonies with a similar density, and was instead equivalent to that of lower density colonies (e.g. Haycock & Threlfall 1975), perhaps indicating that fewer individuals in this study were encouraged by food shortage to eat each others' eggs. Not only do the Lesser Black-backed Gulls on Flat Holm have protected status, they have access to plentiful and predictable food supplies throughout the Severn Estuary and Bristol Channel region. The edible waste generated by the cities of Cardiff, Newport and Bristol, and surrounding towns, is within flying distance of Flat Holm, such that the island's gulls should not have difficulty consuming the food required for successful egg production. It appears, therefore, that all but the lowest quality and youngest breeders are capable of successful breeding until the hatching stage.

Further indications of Flat Holm's suitability of as a breeding site for Lesser Black-backed Gulls can be seen in the estimates for adult survival, which, at approximately 90% to 95%, compare favourably to that reported at rural colonies elsewhere (e.g. 91% by Wanless et al. 1996 and Camphuysen & Gonerts 2012). Ringing resightings also show that Flat Holm's Lesser Black-backed Gulls survive and return to breed despite certain individuals making substantial migratory journeys to destinations as far away as the Gambia. As such information relies on people seeing ringed birds and reporting their observations, it is possible that Lesser Black-backed Gulls visit a wider range of locations than that shown in Figure 7.

Placing Flat Holm's Lesser Black-backed Gulls in the wider context

The Lesser Black-backed Gull is on the Birds of Conservation Concern Amber List (Eaton et al. 2009). This is because Great Britain supports a large proportion of the biogeographic population of this species, and because breeding is concentrated at a relatively small number of main colonies. In non-urban areas, there have been marked declines at several of these sites including the Skokholm and Skomer Special Protection Area (SPA) in Wales, for which the Lesser Black-backed Gull is a feature. Other British SPAs have seen decreases too, notably the Alde-Ore Estuary SPA in Suffolk. The reasons for these declines are thought to include poor breeding success coupled with emigration of breeding adults (Perrins, Sutcliffe & Marsh, personal communications). On Flat Holm, hatching success has been found to be high, despite the population apparently approaching carrying capacity, and adult survival compares favourably to that reported elsewhere (Wanless et al. 1996; Camphuysen & Gonerts 2012). However, this could change. The future of Flat Holm is currently in doubt, as Cardiff Council can no longer afford to continue supporting the Flat Holm Project as it has in recent decades. Also, it is unclear how the island's gulls, a designated feature of a nationally protected site, might respond to environmental changes, such as developments to harness tidal energy from the Severn Estuary. Such projects could alter food availability, especially since breeding adults appear to rely on foods obtained from the Estuary (e.g. spawning polychaetes) rather than refuse to feed very young chicks (Stanworth 1998; Ross-Smith 2009).

Another factor that has already affected Flat Holm's Herring Gull population is the closure of landfill sites. This could affect Lesser Black-backed Gulls in a similar way in future. For example, many Lesser Black-backed Gulls ringed on Flat Holm have historically foraged at landfill sites in coastal South Wales and Gloucester. Most of these sites have closed and gull scaring measures introduced at those that remain. Since these changes have occurred, ringing resightings show that birds have dispersed to other tips in places such as Merthyr Tydfil, Shropshire and Berkshire. Lesser Black-backed Gulls are adapted to travelling the long distances to landfill sites (Verbeek 1977), and to other sources of food (e.g. Mortimer 2012). For example, several pairs of Lesser Black-backed Gulls breeding on Steep Holm are known to exploit mainland sources of Signal Crayfish *Pacifastacus leniusculus* (Mortimer et al. 2012). It seems quite possible, however, that further changes of this sort will eventually affect the Lesser Black-backed Gulls breeding on Flat Holm, perhaps reducing the island's viability as a nesting site, with potential implications for the island's SSSI designation.

Acknowledgements

Annual counts and ringing would not have been possible without the help of dedicated staff from the Flat Holm Project, and several volunteers. Maurice Durham and other members of the Severn Estuary Gull Group have been particularly helpful. This paper could not have been produced if hundreds of people had not taken the time over the years to resight Flat Holm's gulls and submit their records. Thanks for Dave Leech and Allison Kew for providing the RAS trend, and to Jeff Davey and Dewi Langlet for assisting with fieldwork on Flat Holm in 2007 and 2008.

References

Bates, D.M., Maechler, M. & Dai, B. 2008. lme4: linear mixed-effects models using S4 classes. R package version 0.999375-28.

Bolton, M. 1991. Determinants of chick survival in the lesser black-backed gull: relative contributions of egg size and parental quality. Journal of Animal Ecology 60: 949-960.

Camphuysen, C.J. & Gronert, A. 2012. Apparent survival and fecundity of sympatric Lesser Black-backed Gulls with contrasting population trends. Ardea 100: 113-122.

Crawley, M.J. 2007. The R Book. John Wiley & Sons Ltd, Chichester.

Davis, J.W.F. & Dunn, E.K. 1976. Intraspecific predation and colonial breeding in Lesser Black-Backed Gulls Larus fuscus. Ibis 118: 65-77.

Eaton, M.A., Brown, A.F., Noble, D.G., Musgrove, A.J., Hearn, R.D., Aebischer, N.J., Gibbons, D.W., Evans, A. & Gregory, R.D. 2009. Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 102: 296–341.

Ferns, P.N. & Mudge, G.P. 1981. Accuracy of nest counts at a mixed colony of Herring and Lesser Black-backed Gulls. Bird Study 28: 244-246.

Harris, M.P. 1964. Aspects of the breeding biology of the gulls Larus argentatus, L. fuscus and L. marinus. Ibis 106: 432-456.

Haycock, K.A. & Threlfall, W. 1975. The breeding biology of the Herring Gull in Newfoundland. Auk 92: 678-697.

Jehl, J.R. 1994. Absence of nest density effects in a growing colony of California Gulls. Journal of Avian Biology 25: 224-230.

Lebreton, J.-D., Burnham, K.P., Clobert, J. & Anderson, D.R. 1992. Modeling survival and testing biological hypotheses using marked animals: a unified approach with case studies. Ecological Monographs 62: 67–118.

Mitchell, P.I., Newton, S.F., Ratcliffe, N. & Dunn, T.E. 2004. Seabird populations of Britain and Ireland. Results of Seabird 2000 (census 1998 – 2002). London: T. & A.D. Poyser.

Mortimer, K., Rowson, R., Mackie, A.S.Y., Clark, P.F., Maslen, C., Smith, A.S. & Harrowe, C. 2012. Steep Holm Island, Bristol Channel, UK: evidence of Larus fuscus Linnaeus, 1758 (Lesser Black-backed Gull) feeding on the invasive Signal Crayfish, Pacifastacus leniusculus Dana, 1852. BioInvasions Records 1: 201–208.

Mudge, G.P. 1978. Ecological studies of Herring Gulls (Larus argentatus Pont.) and other Larini, in an urban environment. PhD thesis, University of Wales, Cardiff.

Murphy, E.C., Hoovermiller, A.A., Day, R.H. & Oakley, K.L. 1992. Intracolony variability during periods of poor reproductive performance at a Glaucous-winged Gull colony. Condor 94: 598-607.

Oro, D. 2008. Living in a ghetto within a local population: An empirical example of an ideal despotic distribution. Ecology 89: 838-846.

R Development Core Team. 2008. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna.

Ross-Smith, V.H. 2009. Pecking response in Lesser Black-backed Gull chicks Larus fuscus. PhD thesis, Cardiff University.

Stanworth, A.J. 1998. Egg production and diet in the Lesser Black-backed Gull. PhD thesis, University of Wales, Cardiff.

Thaxter, C.B., Lascelles, B., Sugar, K., Cook, A.S.C.P., Roos, S., Bolton, M., Langston, R.H.W. & Burton, N.K.H. 2012. Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. Biological Conservation 156: 53-61.

Verbeek, N.A.M. 1977. Comparative feeding ecology of Herring Gulls Larus argentatus and Lesser Black-backed Gulls Larus fuscus. Ardea 65: 25-42.

Wanless, S., Harris, M.P, Calladine, J. & Rothery, P. 1996. Modelling responses of Herring Gull and Lesser Black-backed Gull populations to reduction of reproductive output: implications for control measures. Journal of Applied Ecology 33: 1420-1432.

Worrall, D.H. 1987. The effect of botulism on a breeding colony of gulls. In, Sonderdruck

aus Verhandlungsbericht des 29. Cardiff: Internationalen Symposiums über die Erkrankungen der Zootiere, pp. 25-31.

Dartford Warbler. *Photo: Paul Roberts*

A preliminary study of Common Crossbill *Loxia curvirostra* vocal types in Wales

Andrew Dixon

22 Bronant, Talgarth, Brecon, LD3 0HF

Summary

Common Crossbills *Loxia curvirostra* breeding in Wales exhibited two different types of excitement call, corresponding to the type A and type E calls defined by Summers et al. (2002). The excitement calls of birds within breeding pairs matched each other, whilst pairs with different call types were found breeding in the same forest at the same time, with active nests as close as 50 m. I discuss this preliminary study in the context of recent suggestions that the different call types of Common Crossbills may represent distinct species.

Crynodeb

Dangosodd unigolion o'r Gylfin Groes *Loxia curvirostra* yn nythu yng Nghymru ddau wahanol fath o alwad cyffro, yn cyfateb i alwadau o fath A a math E yn ôl diffiniad Summers et al. (2002). Roedd galwadau cyffro adar mewn pâr oedd yn nythu yn cyfateb i'w gilydd, tra roedd parau gyda galwadau o wahanol fathau yn nythu yn yr un goedwig ar yr un adeg, gyda nythod mewn defnydd cyn agosed â 50m i'w gilydd. Rwyf yn trafod yr astudiaeth ragarweiniol yma yng ngyswllt awgrymiadau diweddar y gallai'r gwahanol fathau o alwad yn y Gylfin Groes ddynodi rhywogaethau gwahanol.

Introduction

Crossbills have distinctive flight ('chip') and excitement ('tchoop') calls that, despite their apparent simplicity, show marked differences when represented visually on a sonogram (e.g. Groth, 1988; Robb, 2000; Summers et al., 2007). Jeffery Groth (1988), studying Crossbills in America was the first to note that Crossbills formed groups of 'vocal types' and that morphological variation, such as body and bill size, was less within vocal types than between them. Crossbills of different vocal types can occur in the same area, which together with morphological differentiation and evidence of assortative mating led to the conclusion that they should be regarded as full biological species (Groth, 1993). In Britain, the great field ornithologist Desmond Nethersole-Thompson (1975) noted the different vocalisations of crossbills living in the Caledonian Pine *Pinus sylvestris* forests of Scotland and he considered these 'Pine Crossbills' to be distinct from Common Crossbills *Loxia curvirostra*. Subsequently, detailed studies of morphology, genetics and vocalizations have been undertaken to elucidate the status of Britain's only endemic species, the Scottish Crossbill *Loxia scotica* (Knox, 1976; 1990a; 1990b; Piertney et al., 2001; Marquiss & Rae, 2002; Summers et al., 2002; 2007). This work led to the recognition that three, not two, species of crossbills regularly breed in Scotland: Common Crossbill, Scottish Crossbill and Parrot Crossbill *Loxia pytyopsittacus* (Marquiss & Rae, 2002; Summers, 2002).

The three recognized crossbill species that breed in Britain are not distinguishable by plumage characters (Knox 1990b), and no genetic difference has yet been identified (Piertney et al., 2001). Morphologically, two of the taxa are distinguishable by bill size, Parrot Crossbills having a greater bill depth than Common Crossbills (Svensson, 1992). Scottish Crossbills have intermediate sized bills, with a mean depth of 11.6 mm compared to 10.7 mm and 13.4 mm for Common and Parrot Crossbills respectively (Knox, 1976). However, Scottish Crossbills can, like the other two taxa, be distinguished by their diagnostic calls (Summers et al., 2002). There is some evidence that crossbills with different sized bills vary in their ability to exploit different conifer species, with larger-billed birds better able to extract pine seeds and smaller–billed birds being more suited to extracting seeds from spruce and larch cones, though this differentiation is not well defined (Marquiss & Rae, 2002). Crossbills in Scotland mate assortatively according to bill size and call, with pairs of mixed bill size and/or call type occurring infrequently - approximately 1 in 20 pairs were mixed, and this was considered insufficient not to classify the three taxa as distinct species, as long as the calls were diagnostic (Summers et al., 2007).

If a diagnostic call type is sufficient to recognize the Scottish Crossbill as a full species, it follows that assortative mating for call and bill size could also be sufficient to recognize hitherto cryptic species among Common Crossbills, especially if there is also evidence of adaptation to different conifer resources (Edelaar et al., 2003; Edelaar & Terpstra, 2004;

Female Crossbill. *Photo: Paul Haffield*

Edelaar, 2008; Edelaar et al., 2008). However, categorizing and identifying distinct vocal types is not straightforward and different researchers may recognize different call types. For example, Robb (2000) identified six vocal types based on flight calls, whilst Summers et al. (2002) identified three Common Crossbill vocal types based on a combination of flight and excitement calls. A further six different flight call types have been identified in southwest Europe (Förschler & Kalko, 2009). Constantine and The Sound Approach (2006) give some of these call types evocative and strange sounding names such as 'Bohemian', 'Phantom' and 'Glip'. The number of vocal types may increase further depending on the way different calls are classified and increased field sampling.

To better understand the role of vocalisation in the reproductive isolation of crossbill taxa, more information is required on the distribution of vocal types and the habitats they occupy. In this study I present preliminary data on call types identified from Common Crossbills breeding in Sitka Spruce *Picea sitchensis* plantations in Wales.

Methods

In 2012, a good cone crop year for Sitka spruce, I recorded Crossbills at nine nests in two Welsh forests in Breconshire and one nest in Haldon Forest, Devon. Recordings were made when the females, and males if they were present, gave alarm calls during nest monitoring visits. Males were also recorded giving excitement calls when they visited their nests to feed their mate incubating eggs or brooding small young. Recordings were made from the ground at distances of ca. 5 to 50m using a digital voice recorder (Olympus VN 8600PC) with a microphone attachment (Olympus ME51S). I analysed the recordings using the interactive sound analysis software Raven Lite V.1 (Cornell Laboratory of Ornithology) and compared the resulting sonograms with those published by Summers et al. (2007) and Robb (2000). I have used the nomenclature of Summers et al. (2007) for the different types of excitement and contact calls identified in this study.

Results

I identified two types of excitement calls in the Welsh study areas and third excitement call type in Haldon Forest, Devon. Each corresponded to the excitement call types described by Summers et al. (2007), with excitement call types A (29%, N = 4) and E (71%, N = 10) recorded in Wales and type B in Haldon Forest (N = 2). In addition to the excitement call, the flight call of one male was also recorded, corresponding to type 4E of Summers et al. (2007). The type A call had three or four bands in the range 1.7-4.5 kHz with the lowest two bands giving the strongest signal and the third and fourth bands being generally weak; all the bands had a clearly descending overall contour (Figure 1). The type E call had two bands in the range 1.5 to 4.8 kHz with a steeply descending contour and a prominent step in the lower band. The type A and E calls correspond to the type E 'chip' and type C 'glip' calls, defined by Robb (2000), whilst type B corresponds to Robb's type A 'keep' calls.

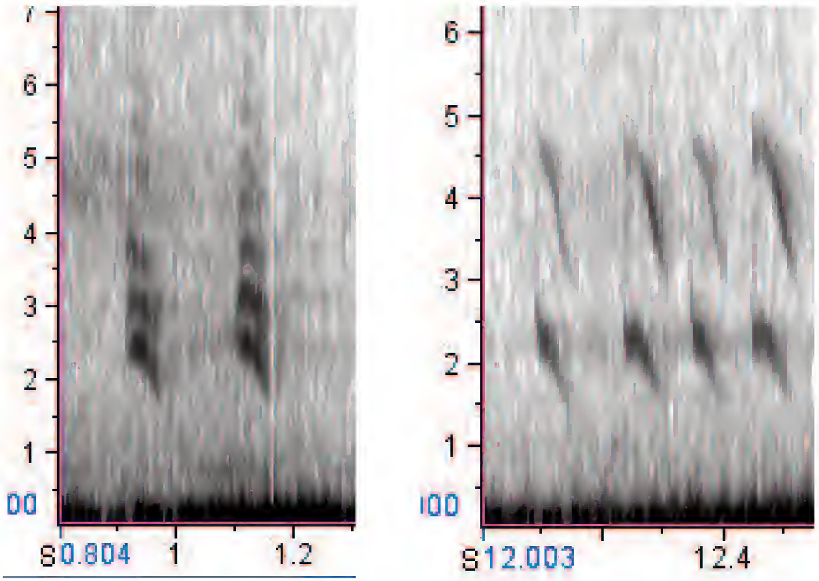


Figure 1. Type A excitement call (left) and type E excitement call (right) recorded in Breconshire.

I recorded excitement calls of five breeding pairs at a forest in Wales and one pair in Haldon Forest, Devon. In all cases the call types of paired males and females matched; three pairs with type E and two pairs with type A excitement calls in Wales, and a pair with type B excitement calls in Devon. In Wales, the five pairs exhibiting different excitement calls bred in the same forest, all within an area of 8ha where simultaneously active nests were as close as 50m.

Discussion

This preliminary study shows that Crossbills with different excitement call types breed sympatrically, and at the same time, in the Sitka spruce forests of Wales. In this study excitement call type E was the most frequent, which contrasts with a Scottish study where type A was the most frequent excitement call (88%, N = 36) and type E calls comprised just 8% (N = 3; Summers et al., 2002). Magnus Robb (2000) reported that type A calls were known only from Britain and the Netherlands (where it was rare) and was recorded in good numbers by Simon Elliot in the spruce forestry of Kielder Forest, Northumberland, whilst type E and B calls were the most common call types found in northern Europe. Interestingly, I found no type B in Wales, yet the one pair recorded in Haldon Forest, Devon gave this type of excitement call and only 5% of Common Crossbills in Scotland gave this call (Summers et al., 2002). This suggests that there may be some regional variation in the frequency of different Common Crossbill call types across Britain, similar to that found in southwest Europe (Förschler & Kalko, 2009). Alternatively, call types may vary temporally, depending on the origin of the breeding immigrants in any particular year.

I also found that breeding pairs had matched excitement call types, though admittedly the sample of five pairs in Wales and one in England is very small. It was also clear from observations of three nests from a hide that female Crossbills are able to recognize their mate from his flight calls, as they became visibly more alert and excited when their own mate was heard approaching the nest area but were impassive and unresponsive to the flight calls of other Crossbills that frequently passed by the nest area. The matching of call types within breeding pairs is consistent with other crossbill studies (e.g., Groth, 1983; Smith & Benkman, 2007; Summers et al., 2007) and supports the idea of assortative mating for call type in the Common Crossbill. A Dutch study has shown that call types are associated with significant differences in bill size in Common Crossbills (Edelaar et al., 2008), which lends credence to the possibility that Common Crossbills also mate assortatively according to bill size.

The Scottish Crossbill is officially recognized as being Britain's only endemic bird (Parkin & Knox, 2010), and the taxonomic reasoning used to classify the Scottish Crossbill as distinct species could also apply to the different Common Crossbill vocal types (Edelaar, 2008). However, a corresponding case can also be made for considering all the British breeding *Loxia* taxa as forms (ecomorphs) of a single species (see Eck, S. 1981). A major difficulty in using call types to diagnostically identify a species is that calls can change. Cardueline finches are known to match their calls between mates by imitative learning (Mundinger, 1970; 1979) and changes in call type has been documented in Crossbills, though the reported frequency of switching from one call type to another is low (Keenan & Benkman, 2008). However, call switching is difficult to detect in the field and may be more common for some age classes or call types than others. If a species is defined by its call type, and individuals can change their call types by learning, this does not mean they also change their species! In order for a population of crossbills to be defined as a species, recognizable by a distinctive call type, they must be essentially reproductively isolated from other crossbills with different call types. It is the reproductive isolation that defines them as a species, not the call type.

Crossbills are thought to benefit by forming flocks with companions that have similar foraging preferences that are determined by bill size. Thus, distinctive call types associated with bill size enable crossbills to form flocks with conspecifics that have similar ecological specialization in foraging. Crossbills are believed to choose mates from within flocks, reducing the potential for the formation of mixed pairs that could result in reduced foraging performance (Smith et al. 1999) and reproductive success (Snowberg & Benkman 2007). In this way, call types could, in theory, become reproductively isolated, behaving as distinct species with only limited 'hybridization'. The evidence for such reproductive isolation in Common Crossbills is weak, though arguably no weaker than that proposed for the reproductive isolation of Scottish Crossbills, and care needs to be taken not to classify all crossbill forms prematurely as species only on the basis of vocal types (Förschler & Kalko, 2009).

There is much to learn about Common Crossbills, and there is still scope for the type of amateur work described here to contribute new and interesting data on vocal types. Does the frequency of vocal types vary between forests, or across years? Do different vocal types occur together in feeding flocks? Do different vocal types tend to forage on different conifer species? Bird ringers can contribute by relating Common Crossbill biometrics, such as bill size, to call types, whilst it would be valuable to collaborate with professional researchers in order to collect samples for stable isotope and DNA analyses in order to determine regional origins, genetic differentiation and the level of extra-pair fertilizations in crossbills.

Acknowledgements

Thanks to Paul Haffield (PH) and Mark Lawrence (ML) for their assistance in this study. Recordings of breeding Common Crossbills were made under Schedule I disturbance licences issued by the Countryside Council for Wales (to PH and AD for Breconshire) and English Nature (to ML for Devon). Thanks too to referees Jerry Lewis and Reg Torpe for their comments.

References

Constantine, M. & The Sound Approach. 2006. *The sound approach to birding: a guide to understanding bird sound*. The Sound Approach, Poole, UK.

Eck, S. 1981. Reflections on the taxonomy of the Western Palearctic Loxia species (Aves, Passeriformes, Fringillidae). *Zoologische Abhandlungen/Staatliches Museum für Tierkunde in Dresden* **37**: 183-207. [In German]

Edelaar, P., Summers, R. & Lovchenko, N. 2003. The ecology and evolution of crossbills Loxia spp: the need for a fresh look and an international research programme. *Avian Science* **3**: 1424-8743.

Edelaar, P. 2008. Assortative mating also indicates that common crossbill *Loxia curvirostra* vocal types are species. *Journal of Avian Biology* **39**: 9-12.

Edelaar, P. & Terpstra, K. 2004. Is the nominate subspecies of the common crossbill *Loxia c. curvirostra* polytypic? I. Morphological differences among years at a single site. *Ardea* **92**: 93-102.

Edelaar, P., van Eerde, K. & Terpstra, K. 2008. Is the nominate subspecies of the common crossbill *Loxia c. curvirostra* polytypic? II. Differentiation among vocal types in functional traits. *Journal of Avian Biology* **39**: 108-115.

Förschler, M. I. & Kalko, E. K. V. 2009. Vocal types in crossbill populations (*Loxia* spp.) of Southwest Europe. *Journal of Ornithology* **150**: 17–27.

Groth, J. G. 1988. Resolution of cryptic species in Appalachian Red Crossbills. *Condor* **90**: 745-760.

Keenan, P. C. & Benkman, C. W. 2008. Call imitation and call modification in Red Crossbills. *The Condor* **110**: 93–101.

Knox, A.G. 1976. The taxonomic status of the Scottish crossbill, *Loxia* sp. *Bulletin of the British Ornithologists' Club* **96**: 15–19.

Knox, A. G. 1990a. The sympatric breeding of common and Scottish crossbills *Loxia curvirostra* and *L. scotica* and the evolution of crossbills. *Ibis* **132**: 454-466.

Knox, A. G. 1990b. Identification of Crossbill and Scottish Crossbill. *British Birds* **83**: 89-94.

Marquiss, M. & Rae, R. 2002. Ecological differentiation in relation to bill size amongst sympatric, genetically undifferentiated crossbills *Loxia* spp. *Ibis* **144**: 494-508.

Mundinger, P. C. 1970. Vocal imitation and individual recognition of finch calls. *Science* **168**: 480-482.

Mundinger, P. C. 1979. Call learning in the carduelinae: ethological and systematic considerations. *Systematic Zoology* **28**: 270-283.

Nethersole-Thompson, D. 1975. *Pine Crossbills*. Poyser, Berkhamsted.

Parkin, D. T & Knox, A. G. 2010. *The Status of Birds in Britain and Ireland*. Helm, London.

Piertney, S. B., Summers, R. W. & Marquiss, M. 2001. Microsatellite and mitochondrial DNA homogeneity among phenotypically diverse crossbill taxa in the UK. *Proceedings of the Royal Society Series B.* **268**: 1511-1517.

Robb, M. S. 2000. Introduction to vocalizations of crossbills in north-western Europe. *Dutch Birding* **22**: 61-107.

Summers, R. W. 2002. Parrot crossbills breeding in Abernethy Forest Highland. *British Birds* **95**: 4-11.

Summers, R. W., Jardine, D. C., Marquiss, M., & Rae, R. 2002. The distribution and habitats of crossbills *Loxia* spp. In Britain, with special reference to the Scottish Crossbill *Loxia scotica*. *Ibis* **144**: 393-410.

Summers, R. W., Dawson, R. J. & Phillips, R. E. 2007. Assortative mating and patterns of inheritance indicate that the three crossbill taxa in Scotland are species. *Journal of Avian Biology* **38**: 153-162.

Male Crossbill. *Photo: Paul Haffield*

Notable Welsh Ornithologists of the Twentieth Century

Graham Williams

14 Dolerw Park Drive, Newtown, Powys SY16 2BA
grahamwilliams@mid-wales.net

Introduction

This short paper is based on a contribution to the Welsh Ornithological Society's 2011 Conference at Carno. In it I have endeavoured to give a brief biography of the dedicated individuals to whom we owe a lot for our knowledge of Welsh birds in the twentieth century and for their contributions to bird conservation in Wales (whilst excluding those who are happily still with us today).

In researching this subject I was constantly drawn to evidence of the huge depth of knowledge and ideas that we have inherited from these pioneers in so many different ways. Characteristically most of them were imbued with an interest in all branches of natural history rather than specializing solely in ornithology and many of them were impressively active in the field, frequently covering great distances on foot. It was also characteristic that they were impressive correspondents exchanging information and ideas with like-minded enthusiasts, as shown by the close inter-connections established by those named below.

H.E.Forrest

Herbert Edward Forrest (1858-1942) was born in Wolverhampton in 1858 and moved to Shrewsbury in the same year where his father opened a music business in Castle Street. On leaving Shrewsbury School he worked for Lloyds Bank in Birmingham then Welshpool but returned to Shrewsbury in 1881 to help rebuild the business when it was destroyed by fire. He was fully involved in this up to his death in 1942, walking the four miles from home to business every day.

In 1893 he became Honorary Secretary and Referee for Zoology of the newly formed Caradoc and Severn Valley Field Club, a post that he held until 1929 when he relinquished it to become President. For no less than 49 years he was therefore the virtual leader of all the Club's varied activities, playing a leading part in its meetings and excursions, contributing numerous papers and lectures and co-ordinating observations to be published in the annual *Records of Facts* concerning the natural history of Shropshire and North Wales. In his obituary it was pointed out that he was always in the forefront on excursions and always ready to turn aside to inspect some 'find' or to solve some problem which had presented itself. An eclectic list of other specialities that attracted his interest included an architectural study of the old houses of Shropshire and a study of the origin and cause of the Ice Age.

Forrest's first major publication was *The Fauna of Shropshire* (1899). This covered not

H. E. Forrest.

Photo by R. L. Bartlett.

only birds but also mammals, reptiles, batrachians and fish at a time when country-wide there was a burgeoning of *The Birds of* the relevant county. From 1900 onwards he followed this up with a major undertaking to perform a similar service for the six counties of North Wales. As a basis for this he circulated widely to landowners and other contacts a list of species recorded in North Wales asking them to fill in information on status for their area. Over a period of seven years he collected and collated an enormous quantity of material. This he supplemented by travelling widely himself to fill in gaps in coverage. His discovery, for example, of several pairs of Golden Plovers nesting near the top of Aran Mawddwy at an elevation of nearly 3000 feet in June 1900 is an indication of how much fieldwork he was carrying out himself. In addition he was engaged in an extensive correspondence with many other naturalists throughout the region and beyond.

The fruits of this major undertaking were realised in the publication in 1907 of a truly remarkable and comprehensive work, *The Vertebrate Fauna of North Wales* which covered mammals, birds, reptiles, fishes and amphibians in some 600 pages. In his Preface he suggested that the book represented to a great extent pioneering work in that Montgomeryshire, Snowdonia and central parts of the district were practically unknown to the zoologist before that time. He also noted that the records from Snowdonia and the central moorlands owed much to the observations of visiting naturalists and, in particular, acknowledged his indebtedness to two of the outstanding field naturalists of his generation, Sidney Cummings (1858-1929), an architect from Chester and Charles Oldham (1868-1942), an insurance manager from Knutsford. Oldham had already collaborated with a fellow Cheshire naturalist, Thomas Alfred Coward (1867-1933) in writing *The Birds of Cheshire* in 1900 followed by a more ambitious work in 1910 on the same lines as Forrest's Vertebrate Fauna, *The Vertebrate Fauna of Cheshire and Liverpool Bay*. The work of a further outstanding field naturalist also featured in Forrest's Fauna, providing information from the Dyfi Estuary. This was Professor John Henry Salter (1862-1942), born at Westleton in Suffolk and appointed first Professor of Botany at Aberystwyth in 1899. Whilst principally a botanist he was also a competent field ornithologist with a special interest in Red Kites, Ravens, Buzzards and Peregrines. It was Salter who took the initial step in 1903 that brought into being an organization for the protection of Welsh Kites which has continued in one form or another to the present day and, though several times perilously close to failure, has kept the Kite as a British breeding bird. Salter had no transport of his own and usually relied on trains or buses (on one occasion he even managed to spot a Merlin's nest whilst on a local bus, lucky enough to see the bird slip off her nest!). In common with many fellow naturalists of the time, Oldham was another notable example, Salter was an indefatigable walker often covering more than 20 miles in a day and only mentioning the distance in his diary when it exceeded 30 miles!

Following on from his 1907 work Forrest maintained his contact with earlier correspondents and was therefore able to bring it up to date with his *Handbook to the Vertebrate Fauna of North Wales* published in 1919. This again made considerable use of the observations supplied by Oldham, Cummings and Professor Salter as well as many other sources.

In the Preface to his 1907 work Forrest issued the following challenge: "Finally, may I suggest to any naturalist having the time and inclination for the work, that a companion volume on the Fauna of South Wales is much needed. All the notes on that district that I have collected would be gladly placed at his disposal". This challenge remained unanswered for nearly 20 years but Forrest must have been delighted when he received a letter in March 1926 from Geoffrey Ingram in Cardiff indicating that he, Captain Gilbert and Captain Morrey Salmon were in the process of collecting material for a list of the birds of South Wales with a view

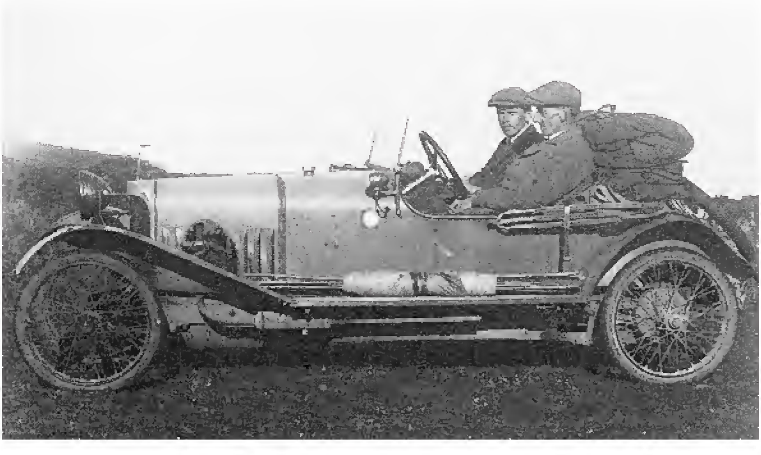
Professor Salter

to publication. Ingram noted that they were receiving assistance from many well known ornithologists in the counties of Pembroke, Carmarthen, Radnor and Brecon but that Cardigan appeared to have few observers and they sought the assistance of Forrest for any records he might have for this or any other of the counties.

From such a diligent correspondent as Forrest this elicited an instant and very encouraging response. In the subsequent exchange of letters it became clear that the original intention was to produce a vertebrate fauna of the six South Wales counties plus Hereford, not on birds alone but on the exact lines of Forrest's works, utilising the same technique of sending check-lists for correspondents to note their observations and records. In practice the original plan proved to be over-ambitious with the outcome that only birds were covered and one county at a time. Thus Ingram and Morrey Salmon produced county avifaunas over a period of thirty years: Glamorgan in 1936, Monmouthshire in 1939, Pembrokeshire (with R.M.Lockley) in 1949, Carmarthenshire in 1954, Radnorshire in 1955, Brecknock in 1957 and, finally, one imagines with a sigh of relief and satisfaction, Cardiganshire (with Bill Condry) in 1966. Captain Gilbert had evidently dropped out at an early stage but he did write *Herefordshire Birds* with Dr. C.W. Walker in 1941.

G.C.S.Ingram and H.M.Salmon

Geoffrey Cheselden S. Ingram (1881-1971) and Harry Morrey Salmon (1892-1985), both born in Cardiff, formed a remarkable partnership which for more than 50 years since their first meeting in 1911 dominated the ornithological scene in south Wales. Both men were very active in the field as well as being keen bird photographers, joining the prestigious Zoological Photographic Club in 1912. In addition to the county avifaunas described above in 1934 they wrote and illustrated *Birds in Britain To-Day* which broke new ground in pioneering bird photography away from the nest (although they also captured some



Ingram and Morrey Salmon (Ingram nearer the camera).

memorable photographs at the nest of species such as Montagu's Harrier and Merlin, the former in Pembrokeshire and the latter on the Kenfig Dunes, a favourite haunt). So many notes appeared over the years over the names of Ingram and Morrey Salmon that eventually Punch magazine decided they must be one person and duly printed their name as "Ingramandsalmon"! Their close relationship never waned and even though Ingram suffered from poor health from the 1950s (and had lost an eye in the First World War) they maintained their friendship until Ingram's death in 1971.

In 1921 Ingram and Morrey Salmon met Arthur Brook (1886 - 1957) who was already doing as much if not more bird photography than they were and who was described as "the outstanding bird photographer of his generation" by Morrey Salmon. He was born in Builth Wells and apart from a period during the Second World War spent all his life in mid-Wales where his skill as a watchmaker contributed to his success in developing remote control and flashlight devices for securing some of his ground-breaking bird photographs (pictures of Red Kite and Peregrine in addition to Merlin, Buzzard and Sparrowhawk flying in with prey to their young are particularly noteworthy). Further mention of Arthur Brook's work will be mentioned in the section under Capt. Gilbert.

In 1971 the RSPB awarded Col. Morrey Salmon its Gold Medal for services to bird protection, especially in Wales, whilst he reciprocated by presenting to the RSPB President a copy of his meticulously compiled history of the Red Kite in Wales, a subject on which he was the acknowledged expert. Morrey's life is comparatively well known, not least because of a recent book (*Footprints in the Sands of Time*) by his sons, which includes a wealth of detail about his notable war record in which he was awarded a Military Cross in the First World War and commanded the RAF Regiment in North Africa and the Mediterranean in the Second World War as well as being appointed a Commander of the Order of the British Empire in 1945. Less information is available about Geoffrey Ingram although, like Morrey, he had a long connection with the National Museum of Wales, being a Member of Court of Governors and Council from 1943-1958. Both men also had a lengthy association with the Cardiff Naturalists Society, Geoffrey being the President at the time of his first contact with Forrest.

Humphrey Gilbert

Humphrey Adam Gilbert (1886-1961) was a barrister who spent most of his life at Bishopstone near Hereford, although the family home was for a time at Llanelwedd Hall near Builth Wells. Somewhat eccentric he acquired the nickname 'Barmy Gilbert' in cricketing circles, based probably on the occasion in a county cricket match when he ran in and bowled an apple! A man of many interests besides being a cricketer of almost Test Match standard he was also a skilled angler with an unrivalled knowledge of the Wye, a keen shot (including puntgunning) and he established in 1934, with Mackworth-Praed, the first regular ringing station for wildfowl, at Orielton in Pembrokeshire. He was an active egg collector until 1931 when he resigned from the British Oological Association in protest at Nethersole-Thompson exhibiting a clutch of Kite eggs taken in Wales. As a result he sold the bulk of his egg collection and gave the proceeds to the BTO. From the 1920s Captain Gilbert applied himself to what he described as "the best sport in the world" to use that description of bird photography given in the introduction to *Secrets of Bird Life* (1924), the first of three books in collaboration with Arthur Brook. During this association

Brook to the left and Gilbert, right, photographing near a Golden Eagle nest.

Brook photographed most British breeding birds at the nest; he bequeathed his negatives to the National Museum of Wales.

R.M. Lockley

Ronald Mathias Lockley (1903-2000) was born in Cardiff and grew up in the suburb of Whitchurch where his mother ran a boarding school. His is a very well known life as he was a prolific writer with no less than 58 books to his credit, many of these dealt with his early experiences in Glamorgan and Pembrokeshire although a number of these covered the same ground. While still at school he spent his week-ends and summer holidays living rough in the woods and wetlands adjoining the old Glamorgan Canal. After leaving school he worked with his sister on a poultry farm near St. Mellons. He first visited Skokholm in the summer of 1927, the culmination of a search for an island on which to live and by October had taken a 21 year lease. There his initial plan was to make money out of breeding chinchilla rabbits for their fur, this, however failed as it was difficult to eliminate the indigenous population and in any case the market for rabbit skins for fashion crashed in the economic depression.

In 1931 Lockley invited Mr and Mrs Morrey Salmon to stay on Skokholm to discuss possibilities for collaboration, as a result of which it was agreed that Lockley would write articles for publication and Morrey Salmon would type them up and add photographs. Two years later to assist in studies of bird migration the first Heligoland trap was constructed on the island by Lockley with help from Ingram and Morrey Salmon, making Skokholm the first UK Bird Observatory.

Although as a young man Lockley had not set out to be a seabird scientist and had no formal scientific training, perhaps being best described as a dreamer with an entrepreneurial streak, he found himself in the ideal situation to unravel the life cycle of seabirds which were very poorly understood at the time. His pioneering studies of Puffin, Storm Petrel and, particularly, Manx Shearwater were to thrust him into the forefront of ornithological research. Encouraged by the Editor of *British Birds*, Harry Witherby, Lockley began to make a detailed study of the breeding biology of the Manx Shearwater followed by a series of experiments into their homing abilities. The fruits of his research were published in his first monograph *Shearwaters* in 1942, followed by *Puffins* in 1953 whilst the importance of his contribution to seabird research was confirmed by his co-authorship with James Fisher of *Seabirds* in 1954 in the New Naturalist series.

Ronald Lockley

It is appropriate at this juncture to mention the contribution made by Captain Lionel Digby Whitehead (1877-1938) who entered the Pembrokeshire scene in 1934. He was a Yorkshire-born entrepreneur who in 1903 had set up the highly successful business of Whitehead Iron and Steel Company by purchasing at scrap value an old mill at Tredegar. In 1934 he purchased Ramsey Island as a birthday present for his wife and set about creating a harbour and rebuilding the farmhouse. His inspired and ambitious vision was to create bird sanctuaries under the aegis of the RSPB on the four islands of Ramsey, Grassholm, Skokholm and Skomer. Captain Whitehead proposed that Lockley should be appointed the RSPB's Supervisory Watcher for all four islands. Unfortunately this proposal cut across the loyalty felt by Mrs. Lemon, the autocratic Honorary Secretary of the RSPB's

Photo by Burnicle Studios

L. D. WHITEHEAD, Esq.,
D.L., J.P.

Watchers Committee since its formation 30 years before, for the existing Watchers in Pembrokeshire coupled with some reservations she had about Lockley. Captain Whitehead's plan did not therefore become reality at that time but it is gratifying that over the course of the next 50 years the four islands achieved protection as nature reserves. One happy outcome of the liaison between Mrs Lemon and Captain Whitehead though was that the former encouraged the latter to set up his own bird protection committee in Pembrokeshire with the full support of the RSPB and a contribution of £100 a year. Thus was born the Pembrokeshire Bird Protection Society with Whitehead as President and Lockley as Honorary Secretary. Sadly, Whitehead died in 1938 but under Lockley's guidance the Pembrokeshire Society developed into the West Wales Field Club, then the West Wales Field Society, the West Wales Naturalists Trust (the forerunner of all the Wildlife Trusts in Wales today) and now the Wildlife Trust for South and West Wales.

During the Second World War Lockley was obliged to give up Skokholm and returned to farm on the mainland at Dinas Island, later moving to Orielton where he undertook an intensive four year study of rabbit behavior for the Nature Conservancy as well as re-starting the wildfowl ringing initiated by Captain Gilbert. During this time he played a leading role in setting up the Pembrokeshire Coast National Park in 1952 and in mapping the coastal footpath around the county. In the late 1950s he was largely instrumental in the successful appeal to purchase Skomer, its resale to the Nature Conservancy and a unique arrangement whereby the West Wales Field Society was able to lease the island. As Chairman of the WWFS he led an unsuccessful campaign against the building of a large oil refinery at Milford Haven. Partly as a result of his disappointment at the UK Government's attitude to the environment he emigrated to New Zealand in 1970 to be close to his daughter who was married to a Bay of Plenty farmer. There he was a founder of the Miranda Naturalists Trust, set up to create New Zealand's first bird observatory on the Firth of Thames and continued to travel and write well into old age, visiting islands from the Bering Strait in the north to the Weddell Sea in the south. He died in New Zealand in 2000 at the grand age of 96 and his ashes were scattered on Skokholm in the following year.

What of Lockley the man? David Saunders describes how he and Shirley found their first meeting with him a trifle disappointing in preparing for their stay to warden Skokholm in 1960: "Ronald or Mr Lockley as he was to us then, proved to be a frustratingly taciturn and somewhat remote figure, the only words of wisdom imparted being that we would need a good milking goat and that driftwood would provide all the fuel required."

In 1946 there occurred what was recognized later as a momentous occasion in the life of a major player in the annals of nature conservation in Wales. Writing in *Wildlife, My Life* William Condry says " We also took it into our heads to go and make the acquaintance of Ronald Lockley whose books about living close to nature were then becoming well known. We had wanted to meet him because he was one of the few at that time who was doing anything about nature conservation in Wales. We were keen to learn about the West Wales Field Society which he had recently helped to create….."

W.M. Condry

William Moreton Condry (1918-1998) was born in Birmingham on St.David's Day 1918. His connections with Wales and his interest in the countryside began at an early age through family holidays in Merioneth, followed in the late 1930s by birdwatching expeditions on bicycle with like-minded friends to the Plynlimon area. It was in 1946 that Bill moved to Wales permanently, marrying Penny in April that year. Early the following year they helped Lockley to set up the Dale Fort Field Studies Centre and thereafter Bill was closely associated with the West Wales Field Society as Mid Wales Nature Warden and co-editor with Lockley of the early issues of the journal *Nature in Wales*. In fact Bill sat on committees and held posts in the Society, later the Trust, for 42 years.

Just as the Manx Shearwater and Skokholm were the principal focuses for Ronald Lockley, the Red Kite and Bardsey were especially dear to Bill Condry. Bill was closely involved in discussions with Capt. and Mrs Vaughan about the Kite Committee they were planning and he and Penny became members when it was set up in 1949. Then in 1953 he helped to set up the Bardsey Bird and Field Observatory and was its Honorary Secretary for eight years, later serving as President and elected Honorary Life President in 1990. Lockley had also been present at the initial meeting at Chwilog in 1951 to look into the possibility, amongst other matters, of setting up a bird observatory on Bardsey.

The Kite Committee in 1964. From left to right: R.S. Thomas, Peter Panting, Penny Condry, Col. Morrey Salmon, T.A.W. Davis, Mrs I.M. Vaughan, R.H. Baillie, William Condry, Capt. H.R.H. Vaughan, Dr. Clifford Fenn.

Pre-eminently a field naturalist in the mould of knowledgeable all-rounders such as Professor Salter he was perhaps not by nature a committee man as pointed out by his friend Arthur Chater in his obituary "on occasion causing salutary dismay by being unable to accept a diplomatic solution when he felt it compromised a matter of conservation principle". Nonetheless he made a major contribution in several influential committees including the Wales Committee of the Nature Conservancy where he was involved in setting up some of the early Welsh National Nature Reserves, the Executive Committee of the Council for Nature and the Education Sub-Committee of the Prince of Wales Conservation Committee for Wales where his teaching experience (he taught for ten years at Lapley Grange in Eglwysfach) must have been invaluable. Morrey Salmon had also been a member of the Nature Conservancy Committee for Wales, so ornithology was well represented.

In 1969 Bill became the first warden of the RSPB reserve at Ynys-hir. He and Penny were already living on the estate and it was largely his influence which was crucial in the purchase of the reserve after the death of the owner, Hubert Mappin. There he found himself involved in the varied processes of habitat creation and restoration in the wonderful mosaic of ecosystems at the head of the Dyfi Estuary in the course of which he inspired a substantial amount of voluntary help. In his book *Pathway to the Wild* with typical whimsy he says "life for the warden and his helpers at Ynys-hir is far from being entirely taken up with swiping at sycamores and being beastly to rhododendrons. There is scope for more direct forms of creativity", amply shown by his programme of tree planting and wetland creation up until his retirement.

As well as giving innumerable talks and broadcasts and in the 1960s extramural classes on a wide variety of natural history topics Bill's vivid and wonderfully lyrical writing style and wide-ranging interests made him an author of great distinction with many to his credit including two in the Collins New Naturalist series (*The Snowdonia National Park* in 1966 and *The Natural History of Wales* in 1981). His first book, *Thoreau* was commissioned by Ronald Lockley for Witherby's Great Naturalist series, about the New England philosopher and prophet of self-sufficiency with his passion for close observation of nature and his belief in the "tonic of wildness" which meant much to Bill as well as to Lockley. Bill achieved a wide following for his contributions to Country Diary for the Guardian, the first in 1957 and the last one appeared on the day he died, 30th May 1998.

In a eulogy Chris Fuller then from the Countryside Council for Wales captures for me Bill's wonderful wry sense of humour: "so often when I went to see him and Penny, he would jokingly ask if I had come yet again to cheer him up, knowing only too well that soon I would depress him with accounts of the latest trials and tribulations facing the task of conservation. But despite being saddened by the worsening plight of the natural world in general, Bill had an air of optimism about him. One of his memorable sayings was "go on your way rejoicing" – which is what he always did, always rejoicing in the wonders of Nature and making the most of what life had to offer".

Acknowledgements and Further Reading

I am most grateful for the help of Shropshire Archives which provided the photograph of H.E.Forrest (published in 1906 in Shropshire Historical Descriptive Biography), to Gwent

Archives which provided the photograph of Captain Whitehead (from the Newport Encyclopedia : Coronation Year and Royal Visit Souvenir 1937) and to Colin Richards for the photograph of Professor Salter. Hugh Salmon kindly gave me permission to use the photograph of his father with Geoffrey Ingram.

For further reading of a biographical nature there are many titles to choose from but I pick out below a few of my favourites. The prolific writings (more than 50 books) of Ronald Lockley often overlap in content but of the several which deal with his pioneering days on Skokholm I particularly enjoyed his first, *Dream Island* published in 1930 whilst *The Way to an Island* published in 1941 puts his pre-Skokholm time in context. Later books dealt with his time on the Pembrokeshire mainland and include *Inland Farm* (1943) about his time on Dinas Island and *Orielton* published in 1977 about his experiences on that estate.

Bill Condry was also a prolific author and two books in particular give much insight into his life and fascination with the world of nature (*Pathway to the Wild* published in 1975 and *Wildlife, My Life* published in 1995), although with characteristic modesty in the Preface to the latter book he insisted that “Despite its title this book can hardly claim to be an autobiography. The story of my unadventurous life would not be of the slightest interest to anybody and I have written instead about the world of nature as I have witnessed it…”.

For Geoffrey Ingram and Colonel Morrey Salmon valuable details of their work is given in their book *Birds in Britain To-Day* published in 1934 but much greater biographical detail, particularly about Morrey is given in the book written by his sons in 2011 (*Footprints in the Sands of Time*).

Whilst not strictly biographical in nature the philosophy and interests of Captain Gilbert and Arthur Brook are manifest in their co-authored books (Captain Gilbert wrote the narratives): *Secrets of Bird Life* (1924), *The Secrets of the Eagle and other Rare Birds* (1925) and *Watchings and Wanderings among Birds* (1931). I am not aware of relevant books on Professor Salter but there is a wealth of information about him (and Bill Condry) in Arthur Chater’s *Flora of Cardiganshire* (2010). Likewise there are no books that I can recommend about H.E.Forrest other than his major avifaunas, other information about him is culled from obituaries and other publications of the Caradoc and Severn Valley Field Club.

Observations of a communal Ring Ouzel *Turdus torquata* roost site in North Wales during autumn 2009

Julian Driver

Hafod y Fedwen, Gwyllt Road, Llanfairfechan, North Wales, LL33 0EG

On 26 August 2009 whilst traversing crags at the head of Aber Valley in Gwynedd, North Wales I heard the alarm call of a concealed Ring Ouzel *Turdus torquata* calling from a bushy patch of Ivy *Hedera helix* overhanging a vertical rock outcrop. On closer inspection three Ring Ouzels were flushed from the Ivy and the ground beneath was found to be strewn with bird droppings and regurgitated fragments of red berries. Suspecting that this could be a regular roost I revisited the site again on 31 August at about 10.00 hrs and on this occasion I flushed six Ring Ouzels. As the site was close to my home I was able to continue making regular visits throughout that autumn, brief details of which are as follows.

15 September: two birds were flushed from the roost at about mid-day and three more were seen feeding in nearby Rowan trees.
24 September: at least five Ring Ouzels were disturbed from the roost at about 18.00 hrs and I suspect they had probably settled in for the night. Due to the risks of causing excessive disturbance I did not approach the site too closely and exited the area immediately. It is therefore probable that some birds will have gone undetected.
8 October: an early afternoon visit and as I approached the site four birds flew from the bush and on closer inspection two more were found skulking in the dark recesses at the back of the bush and only flushed at the very last moment. Had I not delved directly in amongst the Ivy from below I am certain they would have gone undetected.
18 October: eight roosting birds were flushed and two more were seen in nearby Rowan Sorbus aucuparia trees during the late afternoon.
26 October: one bird was flushed from the roost during mid-morning visit and another bird was seen feeding on Rowan berries some distance away. It was probable that other Ouzels feeding in the same area may have gone undetected.
29 October: this was a late afternoon visit just prior to dusk and in poor light conditions. The roost site was found to be empty but I had a fleeting glimpse of a probable Ring Ouzel flushed from a nearby rock outcrop.
1 November: my last visit and, as to be expected at this late date, the roost was found to be empty and no Ouzels were seen in the area.

This was a typical Ring Ouzel roost site on an Ivy-covered, fragmented rock face with many dark recesses and was located on an extremely steep, craggy slope between the two high waterfalls of Rhaeadr Fawr and Rhaeadr Fach that tumble down the cliffs forming a cirque around the head of this deep mountain valley. These rocky slopes are vegetated with large tracts of Heather *Calluna vulgaris* and Bilberry *Vaccinium myrtilus* along with numerous scattered Rowan trees.

The amount of time these Ouzels were spending at the roost during the day was most surprising. Presumably this was due to their diet of Rowan berries which could be harvested quickly but require lengthy periods for processing within their crops and the fragmented remains of Rowan berries skins on the ground below the roost was a prominent feature. The location of this roost in close proximity to numerous fruiting Rowan trees was probably more significant than the fact that it was also within a traditional breeding area. The maximum count at the roost was eight Ring Ouzels but, including birds away feeding at the time of my visits, the total number was probably in excess of 10 and both adults and immatures were noted. The regularity in the number of birds recorded during each visit suggested that the roost was occupied by the same birds throughout the period of observations, August to October. There was no doubt that the number of birds recorded at the roost could have been accounted for from the local breeding population since three pairs had nested in that area during the 2009 season and there were other pairs breeding in adjacent valleys. However, it is also equally possible that some of these birds could have been from further afield or even from outside of Wales since Ouzels often come together into small highly mobile feeding groups at the end of the breeding season.

Unfortunately during the ensuing winter of 2009/10 the roost site was totally destroyed during a period of heavy snow when the Ivy bush was carried away down the mountain side, probably by avalanching snow. During 2010 I made several thorough searches of the entire area without locating any alternative roost site but in late September of the following year, 2011, I did eventually find a small roost in an almost identical situation on the nearby crags of Marian Rhaeadr-fawr. This site was being used by at least two immature Ouzels and, again, a noticeable feature was the fragments of Rowan berry skins on the ground below the roost. On this occasion accessing the site was extremely hazardous, making observations difficult and I suspect some Ouzels could have gone undetected. I checked the site again in 2012 but it was found to be unused.

Communal roosting by Ring Ouzels is well known (Cramp 1988) though there appears to be very little detailed information about their roosting habits and I have failed to find any reference to a roost being occupied permanently over such an extended period as occurred at this site.

Reference

Cramp, S. 1988. *Birds of the Western Palearctic. Vol. 5* p.944.

Ramsey Island Manx Shearwater geolocation study: Field Report 2012

Kirk, H.[1], Morgan, G.D.[2] & Guilford, T.[1]

1 Animal behaviour Research Group, Department of Zoology, South Parks Road,
Oxford, OX1 3PS2
2 RSPB Ramsey Island, St Davids, Pembrokeshire. SA62 6PY

Summary

In 2009 we deployed geolocators (British Antarctic Survey) on approximately 20 individual Manx shearwaters breeding on Ramsey Island, Pembrokeshire. Geolocators are archival light loggers which enable us to estimate latitude (from day length) and longitude (from time of midnight/midday) every 12 hours (Phillips et al. 2004). They have been used to successfully study migration in a range of avian species, both marine and terrestrial (González-solís et al., 2009, Egevang & Stenhouse, 2010, Guilford et al., 2011, Gosbell et al., 2012). BAS geolocators also record salt immersion data, allowing us to not only study spatial information but also, to a degree, behavioural activity in seabirds.

During the chick rearing period of each breeding season (July/August 2009-12) we attempted to retrieve, download and redeploy the devices on each individual. We used the geolocator attachment method pioneered by Guilford et al. (2009); for more detailed information regarding the colony location, attachment and capturing methods please see the previous field reports produced each year.

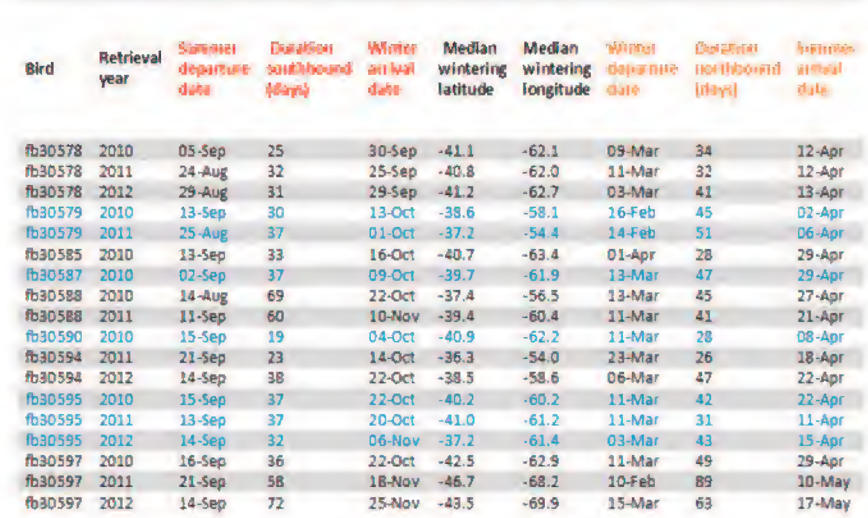
Over the last four years the numbers of Ramsey Manx shearwaters carrying geolocators (here after GLS) has fluctuated as extra birds were added and others had devices removed. For some individuals we have two or more repeat years of data, which have allowed us to look at the repeatability of migratory behaviour within and between individuals. We not only investigate the spatial aspects of migration (route taken on both outbound and return migration and overwintering locations) but also examine the phenology or timing of this behaviour.

Results

By tracking several individuals for repeat migrations we can look at how the timing of migration, the location of the overwintering area and the migratory route changes over time. We can also look for individual consistencies in behaviour, which helps us to understand how Manx shearwaters use the marine environment. The overall migratory route of birds from Ramsey Island agrees with that recorded by Guilford et al. (2009) in that all birds exhibit a clockwise loop migration around the Atlantic Ocean. This route does not change significantly between years and neither does the overwintering location (off the coast of Argentina).

Phenology of migration

In order to record the date of departure on migration we defined this as the last time a bird crosses a radius of 100km around Ramsey and 500km around the median overwintering location. Arrival dates were recorded as the first time a bird crosses the same radii. Table 1 and figure 1 provide a summary of the Ramsey Manx shearwater migratory phenology. Birds leave the breeding colony in early September and arrive in the southern Atlantic by mid-October, the southbound migration taking around 1 month. The shearwaters depart from the overwintering location in early March and return to the UK in mid to late April. We find significant individual fidelity in the phenology of migration with birds tending to depart and arrive around the same dates every year. There was no significant difference in timing across the fours years covered by the data, 2009-2012 (N.B. first deployment was 2009 so first data retrieved in 2010).



Bird	Retrieval year	Summer departure data	Duration southbound (days)	Winter arrival date	Median wintering latitude	Median wintering longitude	Winter departure date	Duration northbound (days)	Summer arrival date
fb30578	2010	05-Sep	25	30-Sep	-41.1	-62.1	09-Mar	34	12-Apr
fb30578	2011	24-Aug	32	25-Sep	-40.8	-62.0	11-Mar	32	12-Apr
fb30578	2012	29-Aug	31	29-Sep	-41.2	-62.7	03-Mar	41	13-Apr
fb30579	2010	13-Sep	30	13-Oct	-38.6	-58.1	16-Feb	45	02-Apr
fb30579	2011	25-Aug	37	01-Oct	-37.2	-54.4	14-Feb	51	06-Apr
fb30585	2010	13-Sep	33	16-Oct	-40.7	-63.4	01-Apr	28	29-Apr
fb30587	2010	02-Sep	37	09-Oct	-39.7	-61.9	13-Mar	47	29-Apr
fb30588	2010	14-Aug	69	22-Oct	-37.4	-56.5	13-Mar	45	27-Apr
fb30588	2011	11-Sep	60	10-Nov	-39.4	-60.4	11-Mar	41	21-Apr
fb30590	2010	15-Sep	19	04-Oct	-40.9	-62.2	11-Mar	28	08-Apr
fb30594	2011	21-Sep	23	14-Oct	-36.3	-54.0	23-Mar	26	18-Apr
fb30594	2012	14-Sep	38	22-Oct	-38.5	-58.6	06-Mar	47	22-Apr
fb30595	2010	15-Sep	37	22-Oct	-40.2	-60.2	11-Mar	42	22-Apr
fb30595	2011	13-Sep	37	20-Oct	-41.0	-61.2	11-Mar	31	11-Apr
fb30595	2012	14-Sep	32	06-Nov	-37.2	-61.4	03-Mar	43	15-Apr
fb30597	2010	16-Sep	36	22-Oct	-42.5	-62.9	11-Mar	49	29-Apr
fb30597	2011	21-Sep	58	18-Nov	-46.7	-68.2	10-Feb	89	10-May
fb30597	2012	14-Sep	72	25-Nov	-43.5	-69.9	15-Mar	63	17-May

Table 1. The phenology of the Manx shearwater migration recorded from 9 individuals breeding on Ramsey Island. The dates of southbound migration are in the red columns and the northbound (return) migration dates are in the orange columns. There are six birds for which there is more than one year of data. We also give the median individual overwintering location used each year.

Route and overwintering location

Figure 2 shows the variation in migration route recorded between individual Manx shearwaters. There is a particularly large variation in the return northbound route after the birds have passed the north coast of Brazil. This variation is due to the degree that each bird makes a westerly movement into the Caribbean, rather than taking a more direct route across the north Atlantic. The northbound migration route is conserved within individuals from one year to the next.

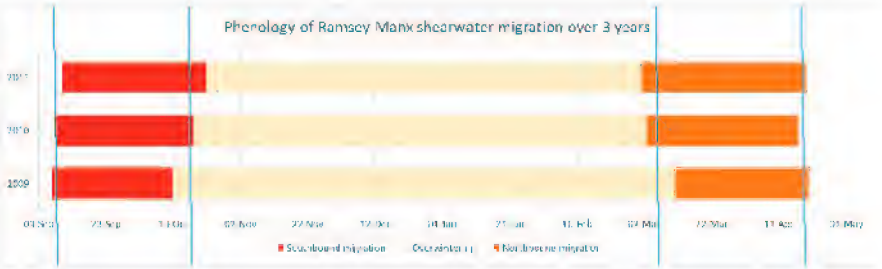


Figure 1. Overall Manx migration dates over four consecutive years (2009-2012) on Ramsey Island (N.B. this applies to three seasons, i.e 2009-10, 2010-11 and 2011-12). The blue lines indicate the median dates for the overall data set, to give an estimate of between year variations. Southbound migration is coloured red (at left) and northbound migration orange (to right).

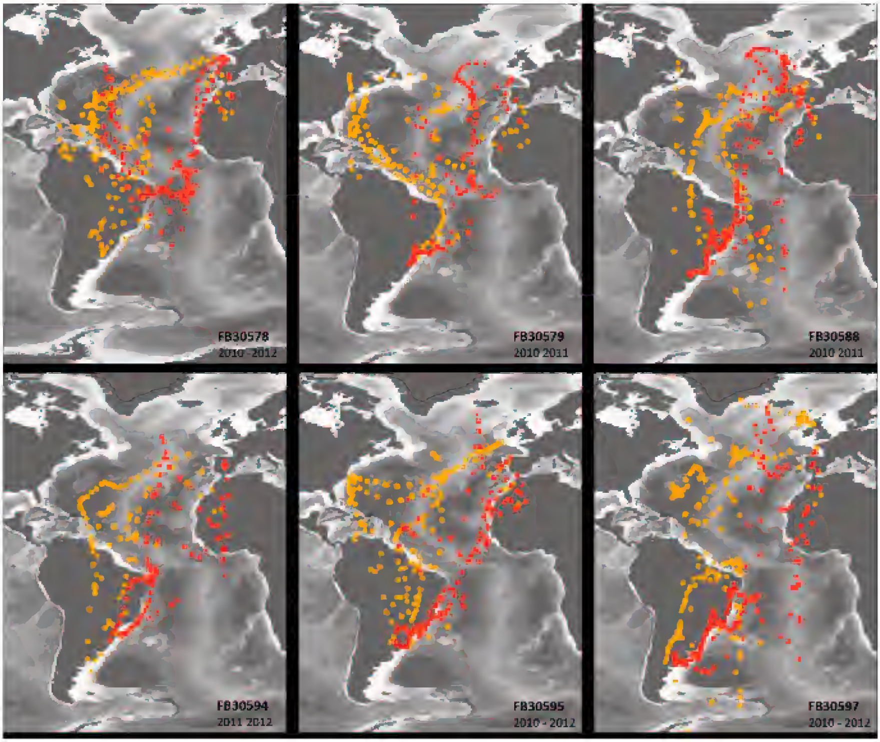


Figure 2. Migration routes recorded from 6 Manx shearwaters breeding on Ramsey Island, Pembrokeshire, Wales. Red points show the southbound migration, orange points the northbound migration. The summer and wintering locations have been removed and the data smoothed using a 3 day moving average. The bird numbers are shown, along with the years when the data were retrieved from that individual.

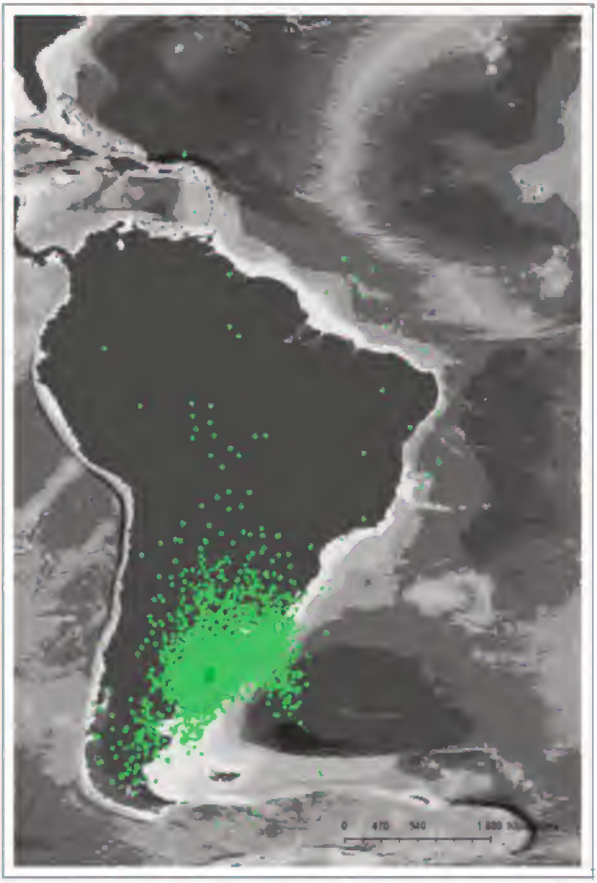


Figure 3. The raw overwintering locations recorded from all the Ramsey Island Manx shearwaters in the study, plotted with the median overwintering location (darker point). The main overwintering area is off the coast of Argentina, around 36.5°, -53.4°.

The Manx shearwaters tracked from Ramsey Island also show a significant level of fidelity in their individual overwintering locations (figure 4). Birds return to similar latitudes every year, despite not being constrained by resource availability (the entire location shown in figure 3 is highly productive). Some birds choose to remain in an area further south than others and go to the same location each year. This raises interesting questions as to how these locations are identified from one season to the next, as there are no landmarks or islands in this area.

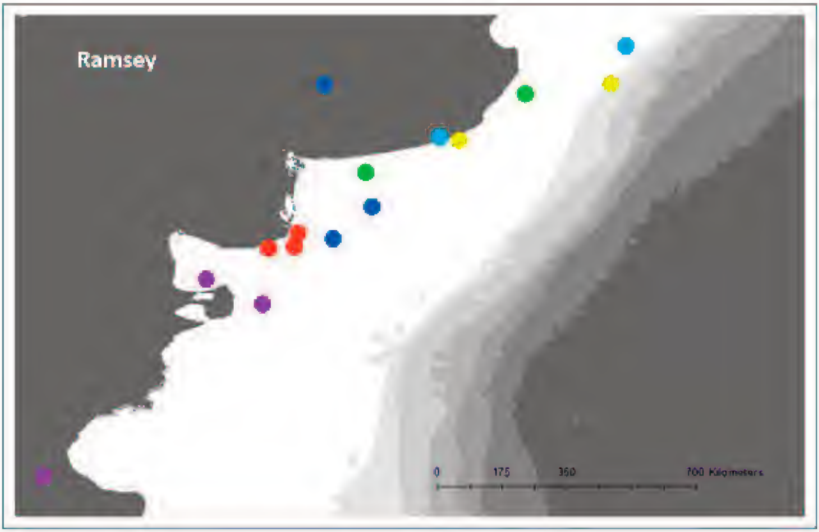


Figure 4. The median overwintering locations for individual Manx shearwaters with repeat years of data, breeding on Ramsey Island. Each bird is represented in a different colour, each dot shows the median location for one overwintering period.

Conclusions and future work

The results described here are currently being combined with similar data collected from four other Manx shearwater colonies around the UK. Together this information tells us a great deal about what these birds do when they leave the breeding colonies every autumn. Manx shearwaters spend most of their lives entirely at sea, only coming on to land to breed. By using geolocators we are able to gain valuable insights into their pelagic behaviour, which would be impossible using traditional methods (such as ringing recoveries and boat based surveying).

Ramsey birds show similar patterns in their migratory timing and route to birds from other colonies, and the overwintering location is highly conserved amongst all colonies. However, shearwaters from Ramsey differ in the relationship between breeding phenology and preceding migration when compared to birds from other colonies. One hypothesis to explain this is that the Ramsey colony is rapidly expanding population following rat eradication on the island. Unlike the nearby Skomer colony, Ramsey has a much lower level of competition for breeding space, which may lead to fewer constraints on the timing of breeding, allowing greater flexibility in migratory phenology.

The Ramsey GLS dataset has one more part which has yet to be thoroughly explored; the salt data. This can be used for several different purposes, both migration and breeding behaviour. Guilford et al discovered previously unrecorded stop over locations in data from Manx shearwaters on Skomer Island. Looking at the spatial migration data from

Ramsey, it looks like this behaviour is present here too, and the salt data will be used to confirm this. We have also developed methods for using the salt data to determine the sex of each bird carrying a GLS. In addition to this we can use the salt data alone to look at behavioural scheduling during the breeding season, information which would usually require manual collection and methods which are highly disruptive to the birds themselves.

Acknowledgements

Work on RSPB Ramsey Island is a joint initiative between the OxNav Research Group (Oxford University) and the RSPB. We would like to offer sincere thanks to the Welsh Ornithological Society and the Countryside Council for Wales for providing funding towards this work in 2012.

References

Egevang, C. & Stenhouse, I. 2010. Tracking of Arctic terns *Sterna paradisaea* reveals longest animal migration, *PNAS* **107(5)**: 2078-2081

González-solis, J., Felicisimo, A., Fox, J., Afanasyev, V., Kolbeinsson, Y. & Muñoz, J. 2009. Influence of sea surface winds on shearwater migration detours. *Marine Ecology Progress Series*, **391**: 221-230.

Gosbell, K., Minton, C., & Fox, J. 2012. Geolocators reveal incubation and re-nesting characteristics of Ruddy Turnstones *Arenaria interpres* and Eastern Curlews *Numenius madagascariensis. Wader Study Group Bulletin*, **119(3)**: 160-171.

Guilford, T., Freeman, R., Boyle, D., Dean, B., Kirk, H., Phillips, R., & Perrins, C. 2011. A Dispersive Migration in the Atlantic Puffin and Its Implications for Migratory Navigation. *PLoS ONE*, **6**, e21336.

Guilford, T., Meade, J., Willis, J., Phillips, R. a, Boyle, D., Roberts, S., Collett, M., Freeman, R., & Perrins, C. M. 2009. Migration and stopover in a small pelagic seabird, the Manx shearwater Puffinus puffinus: insights from machine learning. *Proceedings. Biological sciences / The Royal Society,* **276**, 1215–23.

Phillips, R., Silk, J., Croxall, J., Afanasyev, V., & Briggs, D. 2004. Accuracy of geolocation estimates for flying seabirds. *Marine Ecology Progress Series*, **266**, 265–272.

Tracking the migration of Atlantic Puffins on Skomer Island

Annette L. Fayet[1]*, Dave Boyle[2], Robin Freeman[3], Akiko Shoji[1], Chris Perrins[2] & Tim Guilford[1]

1 Oxford Navigation Group, Department of Zoology, University of Oxford, UK
2 Edward Grey Institute, Department of Zoology, University of Oxford, UK
3 CoMPLEX Lab, University College London, UK

** Author for correspondence: Annette Fayet: annette.fayet@zoo.ox.ac.uk*

Summary

Atlantic puffins *Fratercula arctica* are a key species of UK breeding seabirds; however the migratory and wintering behaviour of these charismatic birds is poorly understood. Miniature tracking devices are now available and allow us to track puffins year-round to learn about their non-breeding behaviour. This is especially important as UK puffin populations are in decline, and understanding their winter distribution is needed to inform appropriate conservation plans.

Since 2007, we have established a tracking programme of Atlantic puffins on Skomer Island to investigate their winter distribution. The emerging results suggest that puffins on Skomer have a highly dispersive migration, with large inter-individual differences in wintering destinations. Continuous deployments over several years are needed to investigate further these unusual migratory patterns, and to assess their validity over longer timescales. Here we give an overview of results obtained in previous years. We also report on the successful deployment of 18 light-loggers on puffins in summer 2012, which we combined with automated burrow sensors at the colony, as an attempt to investigate the potential links between the breeding and wintering behaviour of puffins.

Introduction

Pelagic seabirds are invaluable indicators of the ocean health but are also vulnerable to changes in the marine environment (Einoder, 2009). Many UK seabird populations are declining (JNCC Seabird Monitoring report 2012), due to anthropogenic disturbance such as offshore energy production (Furness et al. 2012), intensive fisheries (Frederiksen et al. 2004) and potentially climate change (Gremillet & Boulinier 2009). However, efficient conservation plans to protect pelagic seabirds are hindered by the lack of knowledge about their at-sea movements, especially during the winter. Traditional methods of study of seabird distribution mostly rely on ringing recoveries and at-sea surveys, which provide scant data and only focus on very small parts of the oceans, mostly in coastal areas. As a consequence, the winter behaviour of pelagic seabirds which tend to stay away from the coasts during the non-breeding season remains a mystery. In the last twenty years, advances in satellite tracker technology have made it possible to track birds at sea, but the longevity of the batteries and size of the devices limited these studies to short foraging movements of large birds such as albatrosses (Jouventin & Weimerskirch 1990). It is only recently that long-lived tracking devices have been miniaturised, enabling the year-round tracking of sub-1000g seabirds (Gonzalez Solis et al. 2007); Shaffer et al. 2006).

Using geolocators (miniature devices which record light levels to provide global position and water immersion data to help resolve behaviour), we have established since 2007 a tracking programme of Atlantic puffins breeding on Skomer Island, Pembrokeshire, Wales. Atlantic puffins are small auks breeding in the North Atlantic Ocean, with large colonies on the British, Scandinavian and Icelandic coasts. Like all pelagic seabirds they spend the non-breeding season at sea. UK puffin populations have been declining for the past 25 years (Harris & Wanless 2011); they are now red-listed on the list "*Population Status of Birds in Wales 2*" and amber-listed on the list "*UK Birds of Conservation Concern 2009*" (Eaton et al. 2009). Despite being one of the most charismatic seabirds of the Northern hemisphere, little is known about the wintering behaviour of puffins. For decades, at-sea surveys and ringing recoveries failed to identify their wintering grounds (Harris 1984). It is only very recently that the first tracking data of Atlantic puffins could be collected, thanks to advances in technology and miniaturisation of devices. Puffins breeding on the Isle of May (East coast of Scotland) mostly seem to winter in the North Sea, with only a few individuals venturing into the Atlantic Ocean (Harris et al. 2010). We present here tracking data collected on Skomer Island, which suggest that puffins in Pembrokeshire have different migratory strategies from those on the Isle of May (some of these results are also reported in more detail in Guilford et al. (2011)). We also report on the successful deployment of light-loggers on puffins in summer 2012, combined with automated burrow sensors at the colony. We are hoping to use these data to detect the timing of breeding events (laying, hatching, fledging) and measure parental investment (number of visits to the nest), to investigate the potential links between the breeding and wintering behaviour of puffins.

Methods

The study colony is located on Skomer Island, Wales, UK (51° 44' N; 5°19' W) on a dense puffin colony which has been monitored for breeding success since the late 1990s. We present here fieldwork realised in summer 2012. The methodology for deployment of tags in previous years, which led to the data presented in the Results section, is similar to the one presented here. All work was conducted after ethical approval from the Countryside Council for Wales, the Skomer Island Advisory Committee, and the British Trust for Ornithology's Unconventional Methods Committee.

Deployment of geolocators

18 birds (8 pairs and 2 singles) were caught at dawn or dusk at their burrows during the breeding season (April-July 2012) using leg hooks and purse-nets. In April, breeding birds were identified by looking for pre-breeding behaviour (beak tapping between partners, courtship behaviour, burrow digging, nest building, mating). In June and July, breeding adults were identified by looking for birds bringing fish to their burrow, which reveals the presence of a chick. Birds were not disturbed during incubation as they are most sensitive and prone to desertion (D. Boyle, pers.comm.). Once caught, birds were ringed using a BTO metal ring and weighed. A geolocator (Mk 13, Mk14, Mk18L - British Antarctic Survey; or Mk4083 - Biotrack) was attached to a Darvic plastic ring using two lightweight

cable-ties (total weight approximately 2g) (Fig. 1). Birds were also ringed using unique colour combinations to facilitate their identification at the colony. They were subsequently released near or into their burrow. The total handling time was less than 10min on average. Following deployment, the colony was regularly monitored with a spotting scope and no immediate nest desertion was witnessed. All tracked puffins seemed to behave normally, and were resighted at the colony in April 2013.

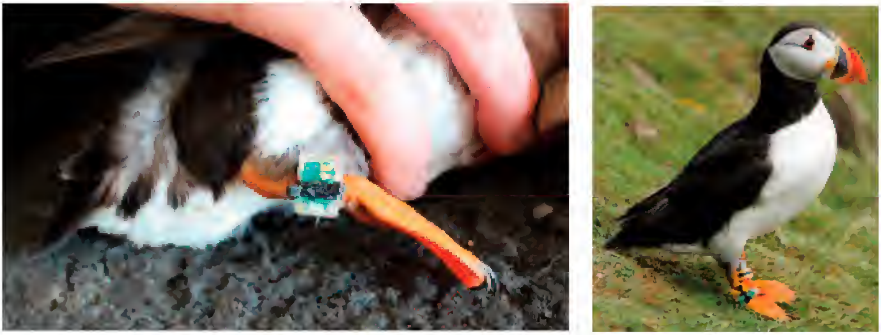


Figure 1 - Puffins carrying geolocators. The device is attached to a plastic ring using two small cable-ties. The bird is ringed with a unique combination of a BTO metal ring and colour ring to facilitate its identification (right).

Retrieval of geolocators

In June and July 2013 and 2014, careful observation of the colony will allow us to identify study birds and their burrows by their colour rings combination. Birds will be caught in a similar way to that of their first capture, using purse-nets or leg-hooks. The geolocator will be removed by cutting the cable-ties open, and a new device might be deployed on the plastic ring. If not, the plastic ring will be removed. Birds will be weighed and released into their burrow. The handling time will be kept to a minimum (10min on average).

Automated burrow sensors

In addition to a geolocator, a small RFID (radio-frequency identification) tag was deployed on each bird. These tags weigh 0.1g and contain a unique number. An RFID logger, consisting of a circular antenna deployed at the entrance of the burrow and a logger powered by a 12V battery, was deployed on each burrow where tagged birds were known to breed (10 burrows). These loggers were initially designed and used by our group to monitor the activity of Manx shearwaters at their burrows (Naumowicz et al., 2010) 24/7. The loggers recorded activity at the nest, from the day the bird was tagged until the end of the breeding season. Every time a tagged bird walks through the antenna while entering or leaving the burrow, the logger records the time and identity of the bird on a memory card, which can then be collected and replaced. In burrows were the chick is accessible, an RFID tag is deployed on the chick to record pre-fledging behaviour and fledging date. In April 2013, the loggers have been redeployed on the same burrows to record the activity patterns of the study birds in summer 2013.

Data analysis - Light data processing

Geolocators record light levels every 5 min, from which it is possible to calculate time of sunrise and sunset to derive longitude and day length to obtain latitude. Light data is decompressed and processed using the BASTrack software suite (Decompressor 19.0, TransEdit 2.0 and Locator 1.0, British Antarctic Survey). A trajectory with two locations per day (at noon and midnight) is obtained. The accuracy of the position is approximately 185km (Phillips et al., 2004) but the latitudinal data becomes highly inaccurate around the equinox (when day length is the same at all latitudes. Therefore we omit the 15 days either side of the fall and spring equinoxes. We eliminate locations based on night periods shorter than 4h, and apply a speed filter which removes any location unrealistically far (>900km) from the previous location. Only months outside the breeding season are included in the analysis (August-March), because the light levels recorded by the loggers are altered during the breeding season by the birds going in and out of their burrows, which creates significant levels of noise in the data.

Data analysis - Winter distribution

We calculated the winter distribution of puffins by performing a density kernel analysis on the whole dataset of daily positions between August and March. We used a cell size of 2.4 and a search radius of 250km. The analysis was performed on ArcMap 10.0 (Esri Inc.). Occupancy contours were then produced by the Geospatial Modelling Environment software (Spatial Ecology LLC).

Data analysis – RFID data processing

At the end of the breeding season all the detections from a burrow are concatenated and processed in MatLab (The MathWorks Inc.). We are hoping to detect major breeding events from changes in the frequency of visits from both partners (e.g. egg laying, incubation shifts, chick-feeding events, fledging), and to investigate how the breeding strategy of puffins potentially affects their migratory strategy, and how in turn the overwintering affects the following breeding season. RFID data has been collected in 2012 and is currently being collected on the same burrows in 2013, and the geolocators currently deployed on the 18 study birds with RFID tags will be retrieved in June and July 2013.

Results

The data from the deployments described above will only be collected in summer 2013 and 2014 and will be presented in a later version of this report. Here, we present some tracking data obtained in previous years, and preliminary results from the automated burrow sensors obtained in 2012.

Individual routes

Skomer puffins showed a remarkable diversity in migratory routes and wintering grounds (Fig. 2). Some went on long-distance migrations to the West North Atlantic Ocean, as far as Greenland (bird 1, in black). Others went to the Mediterranean Sea during the second part of the winter (bird 2, in blue) or near the East coast of Portugal (bird 3, in orange). Finally, some remained near the UK (bird 4, in green).

Nevertheless, the tracks obtained from some individuals that were tracked over several

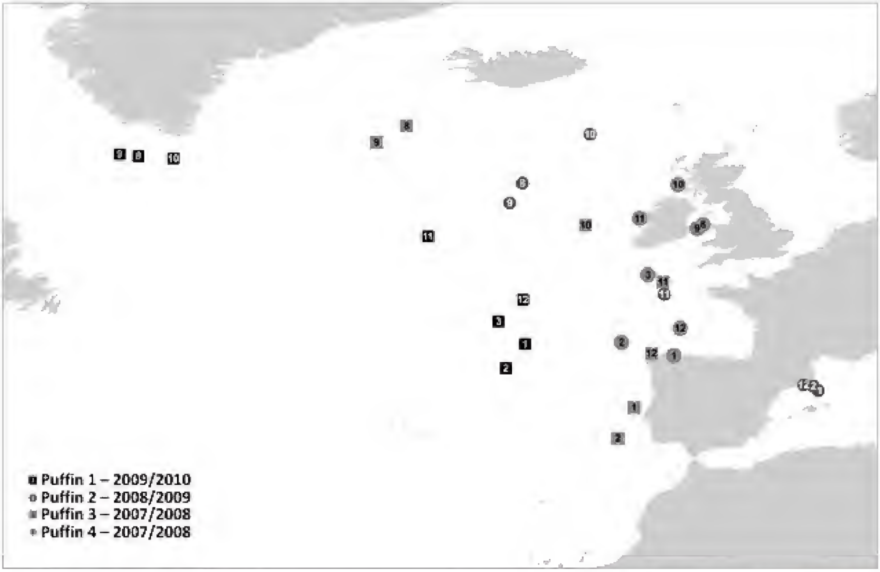


Figure 2 - Example of migratory routes taken by 4 puffins between 2007 and 2010. Each point represents a monthly median position of the bird, the month is indicated by a number between 1 (January) and 12 (December). The black bird went as far as Greenland, while the blue bird went to the Mediterranean Sea. The orange bird spent the start of its migration in the middle of the Atlantic Ocean before coming closer to Europe for the rest of the winter. The green bird stayed near Ireland, before flying towards Spain in December.

winters suggest that individuals are highly conserved in their routes and destinations (Fig. 3).

Winter distribution

The winter distribution of puffins tracked between 2007 and 2010 on Skomer Island is shown on Figure 4, with the coloured areas representing 10 to 60% occupancy contours (i.e. the areas containing the 10% - 60% highest densities), while the green line represents the 90% occupancy contour (i.e. the area which exclude only the 10% lowest density). Areas heavily visited during the winter are the Irish and Celtic Seas, the Bay of Biscay along the French, Spanish and Portuguese coasts, but also the North Atlantic Ocean and the Mediterranean Sea. The 90% occupancy contour (green line) shows that some birds winter over a large part of the North Atlantic Ocean and venture as far west as Greenland and as far North as Iceland.

At-colony burrow activity – preliminary results

By recording the activity patterns at burrows of birds carrying geolocators, we are hoping to investigate the links between breeding phenology, parental investment and migratory

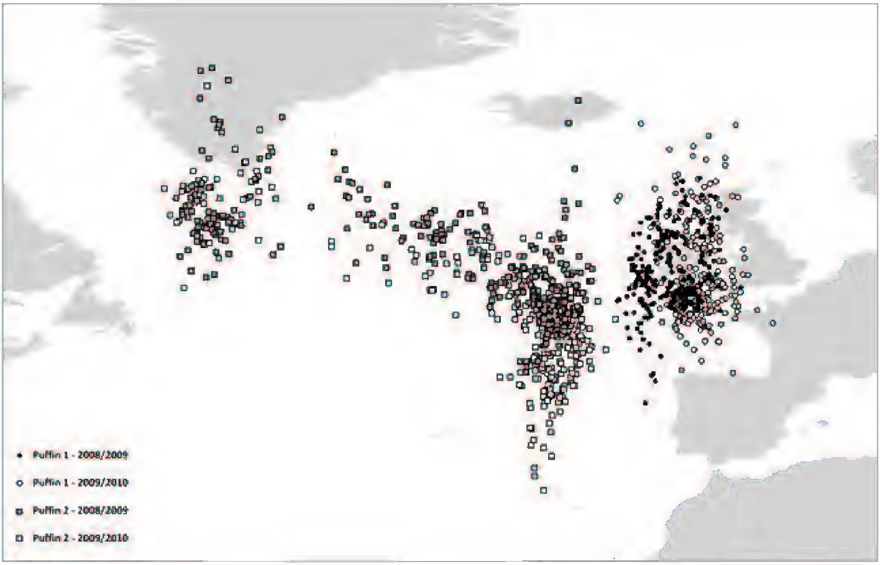


Figure 3 - Repeat routes taken by two puffins in 2008/2009 (blue) and 2009/2010 (red). Each point represents a position estimate for a 12h period (i.e. there are two positions per day, one at midday and one at midnight). The two birds have strikingly different migratory routes (one goes towards Greenland and in the mid-Atlantic while the other remains around Britain and Ireland), but their routes in two different years are remarkably similar. The points on land are due to the inaccuracy of the latitudinal data, especially in September and March.

strategy; however it will only be possible to carry out the analysis after retrieving geolocators from puffins in the summer 2013.

An example of three consecutive days of automated monitoring by a burrow sensor, collected from a pair of puffins rearing a chick in June 2012, is presented on Figure 5. The two partners are in different colours (black and green lines). The peak of chick-feeding activity in puffins is usually at dawn and, to a lesser extent, at dusk (Harris & Wanless 2011). This is visible on Figure 5, with bursts of activity from the two parents at dawn every day. On each day the partner represented in green only visits at dawn and dusk, while the other (in black) also visits the colony during the day on the 29 June. Such patterns may be interesting to look at over the entire breeding season to measure the average parental investment of each bird, as well as to detect the transitions between incubation and chick-rearing.

Discussion

Data collected in the first few years of our puffin tracking programme suggest that some Skomer puffins migrate very long distances to their wintering grounds. Their winter

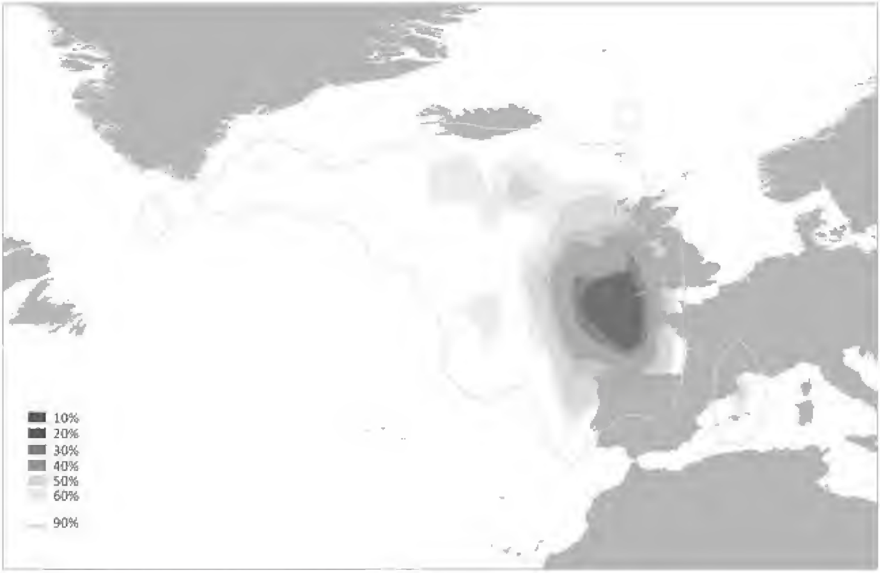


Figure 4 - Winter distribution of 24 puffins from 2007 to 2010. The 10% to 60% occupancy contours are represented in different shades of grey (the darker the shade the higher the proportion of locations recorded in the area) and the 90% occupancy contour (which represents the entire area where locations were recorded except for the least dense 10%) is shown by a light grey line.

distribution covers a large area of the North Atlantic Ocean, but also the Irish and Celtic Seas, the Bay of Biscay, the West coast of Portugal, and the Mediterranean Sea. The migration of puffins from Skomer is unusually dispersive, with different individuals overwintering to very different destinations. This is different from tracking data collected on puffins in East Scotland, where almost all the birds remained in the North Sea all winter, relatively close to their colony (Harris et al. 2010). This may be due to differences in food availability and oceanic conditions between the two coasts of Great Britain. In addition, our first results suggest that individuals show a strong fidelity to their migration route, i.e. there is little difference between their routes in different years. This pattern of migration is unusual in seabirds, and raises interesting questions.

The two established theories on how birds inherit or learn their migration route cannot account for the patterns observed here. The first theory predicts that some birds inherit their route from their parents, that they have an innate compass that directs them to their wintering grounds in their first year. This is unlikely to explain this highly dispersive puffin migration, because the diversity and complexity of routes is such that a genetic coding of the directions and timings is unlikely. In fact, in birds which inherit their migration route genetically, all migrating birds from a subpopulation usually winter in the same area, which can be accessed by flying in one direction for a certain amount of time (e.g. blackcaps *Sylvia atricapilla*; Helbig 1991). The second theory predicts that juveniles learn the route

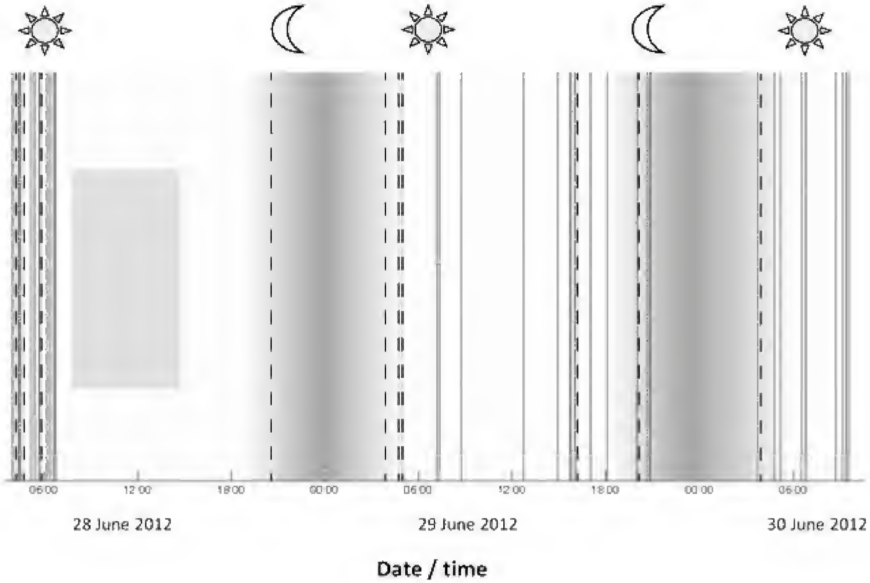


Figure 5 - Example of RFID detections at a puffin burrow during chick-rearing. Each detection (entrance/exit) of the two birds breeding in this burrow is indicated by a line (one bird with continuous greylines, the other with black dashed lines). Approximate times of sunrise and sunset are represented in the background and on top. All times are in GMT.

to their wintering ground culturally, by following their parents, or other adult conspecifics. This is also unlikely to be the case in puffins, because young birds fledge alone at night and leave the colony long before the adults start to leave (Harris & Wanless 2011). An alternative explanation was proposed by Guilford et al. (2011), who suggested that young puffins may explore the ocean for the first few years before reaching sexual maturity, gradually refining their route. This "exploration-refinement" theory could potentially explain the large diversity of routes and the strong fidelity to one's own overwintering destinations observed in our data. Tracking studies encompassing more birds over longer periods of time, and especially young puffins, are needed to be able to find reliable answers to these questions.

We do not yet know how variable and flexible puffins' migratory strategies can be, and therefore the data provided here is only slightly better than a snapshot. An expansion of the data to encompass more individuals and more winters will allow us to refine greatly the emerging picture and to provide the first details of variation in individual migration strategies, while helping to define areas of importance to the winter survival of the birds. With increasing concern regarding potential effects of climate change on marine ecosystems, it is important to understand how the flexibility of puffins's migratory routes in the winter. Combining data from the non-breeding and the breeding seasons, as we are currently trying to achieve using automated burrow sensors at the colony, may help us understand the links between the spatial, temporal and energetic constraints of reproduction and a possibly less constraining non-breeding period. This would be of crucial importance and may help understanding the reasons behind the current declines in UK puffin populations.

Acknowledgements

We are grateful to the many people who helped collecting data in the field, in particular Phillip Collins, Ben Dean and Holly Kirk. We thank Chris Taylor and the Wildlife Trust of South and West Wales for letting us work on Skomer Island. ALF was funded by a joint BBSRC-Microsoft Research scholarship and a Mary Griffiths Scholarship. We are very grateful to the Welsh Ornithological Society, the Wilson Ornithological Society, the Royal Society for the Protection of Birds, the Department of Zoology of the University of Oxford and Vortex Optics for supporting this project.

References

Eaton, M. A., Brown, A.F., Noble, D.G., Musgrove, A.J., Hearn, R., Aebischer, N.J., Gibbons, D.W.,Evans, A. & Gregory, R.D. 2009. Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. *British Birds* **102**: 296-341.

Einoder, L.D. 2009. A review of the use of seabirds as indicators in fisheries and ecosystem management. *Fisheries research* **95**: 6-13.

Frederiksen, M., Wanless, S., Harris, M.,Rothery, P. & Wilson, L. 2004. The role of industrial fisheries and oceanographic change in the decline of North Sea black-legged kittiwakes. *Journal of Applied Ecology* **41**: 1129-1139.

Furness, R., Wade, H. & Masden, E. 2012. Assessing the sensitivity of seabird populations to adverse effects from tidal stream turbines and wave energy devices. *ICES Journal of Marine Science* **69**: 1466-1479.

Gonzalez Solis, J., Croxall, J., Oro, D. & Ruiz, X. 2007. Trans-equatorial migration and mixing in the wintering areas of a pelagic seabird. *Frontiers in ecology and the environment* **5**: 297-301.

Gremillet, D. & Boulinier, T. 2009. Spatial ecology and conservation of seabirds facing global climate change: a review. *Marine Ecology Progress Series* **391**: 121-137.

Guilford, T., Freeman, R., Boyle, D., Dean, B & Kirk, H. 2011. A Dispersive Migration in the Atlantic Puffin and Its implications for Migratory Navigation. *PLoS ONE* **6**.

Harris, M. & Wanless, S. 2011. *The Puffin.* T. & A.D. Poyser, London.

Harris, M., Daunt, F., M. Newell, R. Phillips, and S. Wanless. 2010. Wintering areas of adult Atlantic puffins *Fratercula arctica* from a North Sea colony as revealed by geolocation technology. *Marine Biology* **157**: 827-836.

Harris, M. 1984. Movements and mortality patterns of North-Atlantic Puffins as shown by ringing. *Bird Study* **31**: 131-140.

Helbig, A. 1991. Inheritance of migratory direction in a bird species - a cross-breeding experiment with SE-migrating and SW-migrating blackcaps (*Sylvia atricapilla*). *Behavioral Ecology and Sociobiology* **28**: 9-12.

JNCC. 2012. Seabird Population Trends and Causes of Change: 2012 Report (http://www.jncc.defra.gov.uk/page-3201). Joint Nature Conservation Committee.

Updated July 2012. Accessed 28 November 2012.

Jouventin, P. & Weimerskirch, H. 1990. Satellite tracking of wandering albatrosses. *Nature* **343**: 746-748.

Naumowicz, T. Freeman, R., Kirk, H., Dean, B., Calsyn, M., Liers, A., Braendle, A., Guilford, T. & Schiller, J. 2010. Wireless sensor network for habitat monitoring on Skomer Island. *Local Computer Networks (LCN)*, 2010 IEEE 35th Conference:882-889.

Phillips, R., Silk, J., Croxall, J., Afanasyev, V. & Briggs, D. 2004. Accuracy of geolocation estimates for flying seabirds. *Marine Ecology Progress Series* **266**: 265-272.

Shaffer, S., Tremblay, Y., Weimerskirch, H., Scott, D., Tompson, D., Sagar, P., Moller, H., Taylor, G., Foley, D., Block, B. & Costa, D. 2006. Migratory shearwaters integrate oceanic resources across the Pacific Ocean in an endless summer. *Proceedings of the National Academy of Sciences of the United States of America* **103**: 12799-802.

Cors Goch Yellowhammer Project

Jon Rowe

North Wales Wildlife Trust, 376 High Street, Bangor, Gwynedd, LL57 1YE

The Project Aims were:

1. To provide an education tool for landowners around Cors Goch
2. To provide a sustainable winter food source for Yellowhammers of west Anglesey.
3. To alleviate the dependency of Yellowhammers feeding at one feeding station on west Anglesey.

Project method

Rhuddlan Fawr, an 18 ha undesignated extension to Cors Goch Nature Reserve, was chosen as a good location for a winter feeding crop for Yellowhammers. This was because it has a good population of breeding Yellowhammers identified in a breeding bird survey undertaken in 2006. Rhuddlan Fawr is also situated close to a private feeding station located on a smallholding in Brynteg.

Following site visits with a local botanist the best position for a winter crop was decided by identifying areas with the least botanical diversity. Upon locating these areas the location which best suited the feeding habits of the Yellowhammer was chosen, with shelter from hedges but not enclosed and no predator posts present.

After discussions with the RSPB it was decided that a single crop of oats would be sown in the summer to be cut in the winter.

A contractor with knowledge of wild bird crops was found that could purchase the seed and sow it. The area was mown to remove the grass and thatch, ploughed, disc harrowed, harrowed; oats were then sown and harrowed in. The area was fenced using recycled fencing materials and off cuts to save on cost. Scarecrows where made by a local scout group and put up as initially there were large numbers of gulls and Corvids using the site.

The plan was then to cut75-80% of the crop in strips with a BCS scythe mower to get the grain on the ground, while maintaining uncut grassy margins that were to go to seed as an additional seed crop to fill the hunger gap in the winter. There were discussions about whether to allow livestock access to further disperse seeds but it was felt that any grass seed within the fenced area was too valuable to wild birds as a food source.

The plot was to be monitored throughout the winter taking regular counts at least every other day by the warden, neighbours, and volunteers of Yellowhammers utilising the crop as well as any other anecdotal information deemed useful and relevant of other bird species benefitting.

Results

Unfortunately the crop failed. When the crop was sown large numbers of gulls and corvids were present on neighbouring land due to the spraying of organic material on to fields and they soon discovered the crop within hours of it being sown. Scarecrows were deployed and it was hoped that enough would survive to go to seed.

Summer 2012 was the wettest on record and had the least amount of sunshine this is another cause of the crop failure.

Due to the failure of the crop there are no results of Yellowhammers utilising the crop.

Winter 2012/13 saw several observations by neighbours and the warden of Yellowhammers feeding at pheasant and chicken feeders within the locality of Cors Goch. Some 20-30 were seen in January in a stubble field, located just off the A5025 just before the village of Llanbedrgoch, that remained unploughed due to the ground being to wet. A report from the feeding station located in Brynteg is expected soon.

At least three males have begun to call again at different locations across the reserve.

Improvements

- The seed would be sown in a greater concentration to guarantee germination.
- Scarecrows and bird deterrent devices would be up and working prior to the crop being sown.

An obituary to Jack Donovan MBE 1928-2012

Jack William Donovan, Jack to everyone he met, who has died aged 84 was a remarkable and much loved naturalist who dominated the natural history of Pembrokeshire and especially its ornithology for over half a century.

Jack, whose father served in the RAF was born at Cranwell in March 1928. In 1933 the family went to India for two years and there his sister Kathleen was born in Rawalpindi. On return they settled on the edge of west London where tragically his father died young. Jack's first employment was with the Milk Marketing Board and later the Ministry of Agriculture, Fisheries and Food which in its wisdom despatched him to Pembrokeshire in 1958. What good fortune this proved to be not just for himself but all aspects of natural history in this corner of Wales.

The journal *Nature in Wales*, with four issues a year, published by the West Wales Field Society was then in its hey-day, Jack's first contribution to the Field Notes being five Knot at Broad Haven on 31 August 1958; the observer initials being JD, the more familiar JWD not appearing until the following year with a sighting of an Ortolan Bunting at Marloes on 29 August.

A keen fisherman, especially for Sea Trout, while fishing on the River Taf near Whitland in May 1960 he chanced upon a Spotted Sandpiper. Reports that he and his friends endeavoured to encourage the bird across the county boundary into Pembrokeshire are probably apocryphal. The sighting however resulted in correspondence between two of the Field Society's elder statesmen, asking, who is this fellow who keeps finding all these birds? They must have been impressed, as by the autumn of 1961 Jack had become Bird Recorder for Pembrokeshire, a post he was to hold for the next 40 years; from 1981 sharing the increasingly formidable task with Graham Rees. Not just in compiling the Pembrokeshire Bird Report but in 1994 the *Birds of Pembrokeshire* the county avifauna published appropriately on the centenary of the first, that by the Reverend Murray Mathew.

Jack's industry was incredible as was his encouragement to others, the bird notes section of *Nature in Wales* which he introduced in 1968 evidence of this. Among his own contributions were observations as varied as the decline in Sedge Warblers and food hiding by Jays and Magpies. A regular visitor to the islands he ringed Gannets on Grassholm, Cormorants on St Margaret's and Robins on Skomer. Here he helped with the first census of Lesser Black-backed Gulls and brought the same energy to the efforts to control bracken on the island, no sprays but simply beating it with a stick. In 1968 three

From left to right: Graham Rees, the late Stuart Devonald, Jack Donovan, Skokholm 1997.

young Peregrines had been taken from an eyrie, one of just four pairs in Pembrokeshire, by a well-known local character. Jack's description of the dawn raid by the police when the Peregrines were recovered, and in which he participated, was always well worth hearing.

His post with MAFF, which meant much travel throughout the county, provided superb bird watching opportunities. On one occasion while visiting a farm he suddenly asked the farmer if his wife was expecting a baby. The farmer looked aghast and asked why, to which the reply was 'Look up!' and there was a White Stork circling overhead. Pembrokeshire's only record of a Little Bustard is the result of Jack retrieving a wing from the person who had shot and eaten the bird. Other than holidays often spent abroad he rarely strayed from his adopted county, one exception being a journey to Cornwall in 1979 to see a Belted Kingfisher. He did however have an incredible final twitch in Cornwall and Devon in March 2000, seeing Bonaparte's, Franklin's and Ring-billed Gulls, Sora Rail, Gyr Falcon, Lesser Scaup and King Eider. He was always miffed if a rare bird was seen which he had missed, looking upon it as a personal disaster as one of us, fortunate to discover Pembrokeshire's first White-winged Black Tern in 1973 can testify.

Although Jack was a regular sea-watcher at Strumble Head he was not an early riser like some. Those who participated will recall that much chatter is generated when seabird passage is in progress. When there is a lull the watchers become silent, crouching over

Susan Barclay and Jack Donovan, Skokholm 1989.

'scopes while scanning over the sea seeking the sight of more birds. It was at these quiet times that Jack would pace up and down singing in a very good baritone voice snatches of song, mostly excerpts from Gilbert and Sullivan, favourites such as ‘My object all sublime I shall achieve in time’ and ‘I am the very model of a modern major general.’

Jack prided himself in his realistic imitation of the ‘cronking’ Raven flight call. Whenever one flew past at Strumble he would let rip and be delighted if the bird responded, as they often did. He would then beam and remark ‘I'm fluent in Raven’. After he was unable to participate any longer, should a Raven call when passing, someone among the observers would respond with ‘Morning Jack’. That's a legacy with a difference.

He was a poor sailor; however, this did not prevent him making pioneering ferry crossings from Fishguard to Rosslare in order in his search for seabirds and cetaceans. Neither did it curtail his countless visits in all weathers to both Skokholm and Skomer. One memorable occasion was in May 1990 when the warden Michael Betts reported that a White-throated Robin was present. The only available transport being an inflatable, so gritting his teeth and holding on tight he made the journey and managed to see and photograph this only the second for Great Britain. Jack hated flying, so a particularly memorable occasion was when he was dressed in an extra large bright red survival suit before being taken by Trinity House helicopter to Skokholm. Another was a visit in an even smaller helicopter to Skomer in 1978 during the Christos Bitas oil disaster. On leaving from near the wardens’ house the pilot, with Jack beside him emulated a Puffin, swooping from the cliff top downwards towards the sea.

Indeed the islands dominated much of his time as he was Chairman of the Skokholm and Skomer Committee from 1971 until 2002 save for one break. Committee meetings were always a joy, whether held around the long table in the Trust office in Haverfordwest or better still on the islands. Meetings were always conducted with consummate skill and miracuously speeded up if Wales was playing rugby that afternoon, while his pocket radio was always at hand during island visits in the cricket season. It was not all jolly pleasure; there was much hard work behind the scenes, difficult wardens and their wives sometimes to be mollified, the seemingly endless lease negotiations over Skokholm, vast management plans to be worked upon to mention but three examples.

In 1983 a cricket match was played on Skokholm between an island XI and the Marloes team, this to commemorate a match played against Marloes in 1933 by the Lockley family and other islanders; alas the islanders lost, again! This resulted in a number of follow-up matches on Caldey, Ramsey and Skomer when Jack was appropriately the umpire. His white umpire's coat shall we say enhanced his figure, though as one was not available on Caldey in 1991 the monks provided one of their habits.

Jack was chairman and lynch-pin of the Mid-Pembrokeshire Section of the Wildlife Trust. In this he ably assisted by his beloved wife, Jean. Both worked tirelessly to arrange an interesting programme of walks and talks. Many of us will remember committee meetings at their home, surrounded with birding memorabilia and reinforced with copious mugs of tea provided by Jean, we set to rights the affairs of the Section. These were good times; in fact, in the opinion of some, this was a period when interest in the natural world, in conservation and the workings of the Wildlife Trust was at its highest in this part of our county.

Not since have we had such memorable field trips and who can forget Jack's inimitable style as he regaled us with tales of foreign travel. His knowledge in the field was immense, not only an excellent ornithologist, but a first-class botanist and all-round naturalist of the old school. His enthusiasm was infectious and for many he was the catalyst which instilled in them a lasting interest in the natural world. Whenever Jack gave a talk or led a field trip one could guarantee a large attendance. Who can ever forget the Member's Evenings, the Quiz, which Jack always won, and where there was always a sales table well supplied with jams and chutneys made by Jean.

Jack was active with plant recording in Pembrokeshire as early as 1959 and in that year he was the local correspondent who submitted the Pembrokeshire plant records to *Nature in Wales*. He joined the BSBI in 1962 and enthusiastically helped the late Tommie Warren Davis with his plant hunting visiting many botanical sites together between 1965 and 1980. He assisted Tommie with his *Plants of Pembrokeshire*, published in 1970 commenting on and checking the text, supplying some of the photographs including the cover design of a Foxglove. After Tommie's death in 1980 Jack continued to supply plant records to Stephen Evans, Tommie's successor as Recorder and together they had many happy days out in the field in magical places such as Dowrog Common.

As MAFF drainage officer he was inevitably involved in reducing the extent of

Pembrokeshire's wetlands but he was also responsible for designing and creating many ponds and lakes. Many of the early potato irrigation reservoirs on the Dale, Marloes and St David's peninsulas stand as testimonials to his efforts to ensure that these open water bodies were also of maximum benefit to wildlife. There was no better person than Jack to bring together the sometimes conflicting interests, of wildlife conservation and farming. His tireless efforts in this field being recognised in 1985 with the prestigious Idris Davies Memorial Award for services to agriculture in Pembrokeshire and in 1988 on his retirement by an MBE for services to agriculture and wildlife.

During his many years as one of the outstanding Pembrokeshire all round naturalists Jack led countless Wildlife Trust excursions. Plants would always feature when sites were explored. Through these walks, through his evening talks, through his role on countless site management committees and through his work with the farming community he inspired many to look afresh at the wildlife of Pembrokeshire and to consider what management was needed to ensure its survival.

Jack and Jean called their house *The Burren*, this after the classic botanical site in the west of Ireland which they had visited about the time they moved to Crundale just outside Haverfordwest. Indeed foreign travel and the adventures which go with it was very much part of their life. In Cyprus Jean became worried about his safety as he tore down bird catchers' nets and traps and firmly emphasised to a hunter that dead birds strung around his waist was a sign of cowardice not manliness. In La Gomera in the Canary Islands he was determined to see Bolle's Laurel Pigeon so hired a taxi to travel into the mountains. Peering out of the window at sheer drops at hairpin bends on narrow roads brought on severe vertigo, an unpleasant event he had not experienced before. No more mountains ever again he vowed but he did see the quarry. After retirement in their beloved camper van they journeyed widely both in this country and abroad.

Sadly Jack's later retirement days were marred when he suffered a stroke in 2001. In these later years he still kept informed even attending meetings of the army's Castlemartin Ranges conservation group as late as 2004. Here his vast knowledge of wildlife and land management was tapped into by the military as they prepared and implemented their Integrated Land Management Plans. The sudden loss of Jean in October 2009 was a terrible blow and as his health rapidly declined he became confined to his home at Crundale, Haverfordwest. Visiting naturalist friends shared happy memories of field excursions but these were sometimes curtailed if Test Match cricket was on the television! Right up to the end he studied, with enormous pleasure, the many and varied species of birds at his feeder in the garden. What a man!

His friends